G. Pullaiah College of Engineering and Technology

(Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA (CSE, ECE & EEE) | Permanently Affiliated to JNTUA)

Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS
GPCET – R20

B.Tech Regular Four Year Degree Programme
(for the batches admitted from the academic year 2020- 2021)
&
B.Tech (Lateral Entry Scheme)
(for the batches admitted from the academic year 2021 - 2022)

Preliminary Definitions and Nomenclature

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as Autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (**Jawaharlal Nehru Technological University Ananthapur**).

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., one odd and one even.

Branch: Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

Board of Studies (BOS): BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Backlog Course: A course is considered to be a backlog course, if the student has obtained a failure grade in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry etc., are considered to be foundational in nature.

Commission: Means University Grants Commission (UGC), New Delhi.

Choice Based Credit System: The credit-based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Certificate Course: It is a course that makes a student to have hands-on expertise and skills required for holistic development in a specific area/field.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Internal Examination: It is an examination conducted towards sessional assessment.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student overall the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.

Detention in a Semester: Student who does not obtain minimum prescribed attendance in a Semester shall be detained in that particular Semester. Also a Student can also be detained for lack of required number of credits till II-I/III-I at the end of Second year or Third Year respectively

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal examinations and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means G.Pullaiah College of Engineering and Technology, Kurnool unless indicated otherwise by the context.

Massive Open Online Courses (MOOC): MOOCs inculcate the habit of self-learning. MOOCs would be additional choices in all the elective group courses.

Minor: Minor are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech degree.

Pre-requisite: A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Means, UG degree program: Bachelor of Technology (B.Tech); PG degree program: Master of Technology (M.Tech) / Master of Business Administration (MBA).

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research-based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit-based course and is to be planned carefully by the student.

Registration: Process of enrolling into a set of courses in a semester of a program.

Regulations: The regulations, common to all B.Tech programs offered by Institute, are designated as "GPCET Regulations – R20" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 16 to 18 weeks of academic work equivalent to normally90 working days. Odd semester commences usually in July and even semester in December of every year.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

Program Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioural.

University: Means Jawaharlal Nehru Technological University Ananthapur (JNTUA), Ananthapuramu.

G. Pullaiah College of Engineering and Technology
(Autonomous)
Academic Regulations
Regulations for Four Year Bachelor of Technology (B.Tech) Degree programme for the batches admitted from the academic year 2020-21
&
For B.Tech Lateral Entry batches admitted from the academic year 2021 -2022

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

i. Pursues a course of study for not less than four academic years and in not more than eight academic years. However, for the students availing Gap year facility, this period shall be extended by two years at the most and these two years would not be counted in the maximum time permitted for graduation.

ii. Registers for 160 credits and secures all 160 credits.

iii. The student will be eligible to get Under graduate degree with honours or additional minor engineering if he/she completes an additional 20 credits

iv. A student will be permitted to register either for Honours degree or additional minor engineering but not both.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

3. Courses of study

The following courses of study are offered at present as specializations for the B. Tech. course

S.No.	Name of the Branch	Branch Code
1.	Civil Engineering	01
2.	Electrical and Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science and Engineering	05
6.	Computer Science and Engineering -Artificial Intelligence	31
7.	Computer Science and Engineering -Internet of Things	35

4. Credits:

i. *Credit:* A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture) or two hours of practical work/field work per week.

ii. *Academic Year:* Two consecutive (one odd + one even) semesters constitute one academic year.

iii. *Choice Based Credit System (CBCS):* The CBCS provides choice for students to select from the prescribed courses.

iv. Each course is assigned certain number of credits based on following

	Semester	
	Periods / Week	Credits
Theory	03	03
Tutorial	01	01
Practical	03	1.5
Internship (IV/VI evaluated in V/VII resp.)	-	1.5/3.0
Project work	-	12

5. Course Structure

Every course of the B.Tech program will be placed in one of the 8 categories with minimum credits as listed below.

S.No.	Category	Category Description	Abbreviated Category	Credits
1	Humanities and social science	Humanities and social science including Management courses	HS	10.5
2	Basic Sciences	Basic Science courses	BS	21
3	Engineering Science courses	Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/compute r etc.	ES	24
4	Professional core	Professional core Courses	PC	51
5	Open Electives	Open Elective Courses- from other technical/ emerging and job oriented	OE	12
6	Professional Courses	Professional Elective Courses relevant to chosen specialization/ branch	PE	18
7	Project Work	Project Work, Seminar, Internship in industry elsewhere	PW	16.5
8	Mandatory courses	Environmental Studies, Induction training, Universal human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge (Non-Credit)	MC	0
9	Skill Oriented Courses	Skill Oriented Courses relevant to domain, interdisciplinary, communication skill, industry	SC	10
		Total Credits		160

6. Weightage for course evaluation

6.1 Course Pattern

- The entire course of study is for four academic years. Semester pattern shall be followed in all years.
- A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.
- When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

6.2 Evaluation Process

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, Internships carried out after IV Semester & VI Semester shall be evaluated for 100 marks each and the Internship along with Project Work carried out in VIII Semester shall be evaluated for 200 marks.

- For theory subjects, the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End-Examination.
- For practical subjects, the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End- Examination.

6.3 Internal Examinations:

i. For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination consists of objective paper for 10 marks and subjective paper for 30 marks with duration of 1 hour 50 minutes (20 minutes for Objective paper and 90 minutes for subjective paper). The marks obtained in subjective paper will be condensed to 20 marks. The remaining 10 marks shall be awarded based on the submission of assignments by the student.A student has to submit two assignments in every subject each for 10 marks.

ii. The objective paper shall consist of 20 objective questions each carrying 0.5 Mark.

iii. Subjective paper shall be set for 30 marks containing 3 either or descriptive questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks.

***Note 1: T**he marks obtained in the subjective paper shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark.

iv. If the student is absent for the internal examination other than the mandatory courses, no re-exam shall be conducted and internal marks for that examination shall be considered zero.

v. First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV and V units.

vi. Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam and 20% to the other.

6.4 **End Examinations**:

End examination of theory subjects shall have the following pattern:

There shall be 6 questions and all questions are compulsory. Question 1 shall contain 5 compulsory short answer questions for a total of 10 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them. Each of these questions from 2 to 6 shall cover one unit of the syllabus.

End examination of theory subjects consisting of two parts of different subjects, for eg: Electrical & Mechanical Technology, shall have the following pattern:

Question paper shall be in two parts viz., Part A and Part B with equal Weightage. In each part, there shall be 3 either-or type questions for 10 Marks.

Note: The answers for Part A and Part B shall be written in two separate answer books.

6.5 For practical subjects there shall be a continuous evaluation during the semester for 40 sessional marks and end examination shall be for 60 marks. Day-to-day work in the laboratory shall be evaluated for 40 marks by the concerned laboratory teacher based on the regularity/record/ viva. The end examination shall be conducted by the concerned laboratory faculty and senior expert in the same subject of the department.

In a practical subject consisting of two parts (Eg: Electrical & Mechanical Lab), the end examination shall be conducted for 30 marks in each part. Internal examination shall be evaluated as above for 40 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

6.6 There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the mandatory course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.

6.7 For the subject having design and/or drawing, such as Engineering Drawing, the distribution shall be 40 marks for internal evaluation and 60 marks for end examination.

Day-to-day work shall be evaluated for 10 marks by the concerned subject faculty based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 30 marks with consideration of 80% weightage to the better mid exam and 20% to the other for the finalization of Internal marks. The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark. The sum of day-to-day evaluation and the internal test marks will be the final sessional marks for the subject.

In the end examination pattern for Engineering Drawing there shall be 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing is mentioned along with the syllabus.

6.8 There shall be five Professional Elective Courses from V Semester to VII and for each elective there shall be choices such that the student shall choose a course from the list of choice courses offered by the department for that particular elective.

6.9 There shall be four Open Electives/ Job Oriented Courses common to all disciplines from V Semester to VII, where in the students shall choose the electives offered by various departments including his/her own department in such a manner that he/she has not studied the same course in any form during the Programme.

The students shall be permitted to pursue up to a maximum of two elective courses under MOOCs (Massive Open Online Courses) offered by NPTEL notified by the Department during the semester. Each of the Courses must be of minimum 12 weeks in duration. The student has to acquire a certificate for the concerned course from the NPTEL during the semester only in order to earn 3 Credits.

6.10 There shall be a mandatory **induction program** for three weeks before the commencement of first semester.

6.11 **Minor in a discipline** (Minor degree/programme) concept is introduced in the curriculum for all conventional B. Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.

a. Students who have a CGPA of 8.0 or above (up to II semester) and without any backlog subjects will be permitted to register for Minor discipline programme. A SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration active else Minor discipline registration will be cancelled.
b. Students aspiring for a Minor must register at the beginning of IV Semester and must opt for a Minor in a discipline other than the discipline he/she has registered in.
c. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects each for 4 credits and two MOOCs offered by NPTEL (notified by the Department corresponding to the Minor Programme) each for 2 credits and with a minimum duration of 8 weeks.
d. The student has to acquire a certificate for the concerned course from the NPTEL in order to earn 2 Credits.
e. Students are not allowed to register and pursue more than two courses in any semester. Students may complete the Minor before VIII semester.
f. Each department shall enlist a set of subjects from its curriculum which are core for the discipline without any prerequisites. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation.
g. Students are not allowed to pursue minor discipline programme subjects under Self-study. Classes for the courses of the minor shall be conducted beyond the regular hours.

Student may enlist their choices of Minor discipline programmes in order of preference, to which they wish to join. It will not be permissible to alter the choices after the application has been submitted. However, students are allowed to opt for only one Minor discipline programme in the order of preference given by the student.

h. Minimum strength for offering Minor in a discipline is considered One-Fifth (i.e., 20% of the class) of the class size and Maximum size is Four-Fifth of Class size (i.e., 80% of the class).

i. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. That is, Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.

j. The Concerned Head of the department will arrange separate course/class work and time table of the various Minor programmes. Attendance regulations for these Minor discipline programmes will be as per regular courses.

k. A Student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor discipline programme. No class/division (i.e., second class, first class and distinction etc.) shall be awarded for Minor discipline programme.

l. In case a student drops or fails to meet the CGPA requirement for Degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for Degree with Minor and the student will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioned the additional courses completed by them.

m. This Minor in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in **Computer Science & Engineering** with Minor in **Electronics & Communication Engineering**. The fact will also be reflected in the transcripts, along with the list of courses for Minor programme with CGPA mentioned separately.

6.12 Honors degree in a discipline:

a. This concept is introduced in the curriculum for all conventional B. Tech. programmes. The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.

b. A student shall be permitted to register for Honors program at the beginning of IV Semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of second semester without any backlogs. SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Honors discipline registration active else Honors discipline registration will stand cancelled.

c. In order to earn the Honors degree in his/her discipline, a student has to earn 20 extra credits by studying four advanced specified courses for 16 credits and acquiring the remaining 4 credits through two MOOCs offered by NPTEL which are domain specific in the branch of Engineering concerned, each for 2 credits and with a minimum duration of 8 weeks.

d. The student has to acquire a certificate for the concerned course from the NPTEL in order to earn 3 Credits.

e. The Evaluation pattern of theory subjects shall be similar to the regular programme evaluation.

f. If a student drops or is terminated from the Honors program, the additional credits earned till that time cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following:

   i. All the courses done under the dropped Honors will be shown in the transcript. (or)

   ii. None of the courses done under the dropped Honors will be shown in the transcript.

g. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors

and the student will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

h. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

6.13 National Service Scheme (NSS)/Yoga is compulsory for all the Undergraduate students. The student participation shall be for a minimum period of 45 hours during the first year. Grades will be awarded as Verygood, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets Unsatisfactory grade, he/she has to repeat the above activity in the subsequent years along with the next year students.

6.14 Students shall undergo two summer internships each for a minimum of six weeks duration at the end of second and third years of the programme for 1.5 credits & 3 credits respectively. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising Head of Department and two senior faculty. The student shall submit a detailed technical report along with internship certificate from the Internship organization in order to obtain the prescribed credits. The student shall submit the Internship Project Report along with Certificate of Internship. The evaluation of the first and second summer internships shall be conducted at the end of the V Semester & VII semester respectively.

There shall be internal evaluation for 100 marks and there shall not be external evaluation. The Internal Evaluation shall be made by the departmental committee (Head of the Department and two senior faculty of the department) on the basis of the project report submitted by the student.

Completion of the internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship in the subsequent summer provided that the student doesn't pursue two summer internships in the same summer.

Community Service Project focusing on specific local issues, shall be an alternative to the six weeks of summer Internship, whenever there is any emergency and when students cannot pursue their summer internships. The Community Service Project shall be for 6 weeks in duration which includes preliminary survey for 1 week, community awareness programs for one week, community immersion program in consonance with Government agencies for 3 weeks and a community exit report (a detailed report) for one week. The community service project shall be evaluated for 100 marks by the internal departmental committee comprising Head of the Department and two senior faculty of the department. **However, the first priority shall be given to the internship.**

6.15 There shall also be a mandatory full internship in the final semester (VIII Semester) of the Programme along with the project work. The organization in which the student wishes to carry out the Internship need to be approved by Internal Department Committee Comprising Head of the Department and two senior faculty. The faculty of the respective department monitors the student internship program along with project work. At the end of the semester, the candidate shall submit a certificate of internship and a project report. The project report and presentation shall be internally evaluated for 60 marks by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. The Viva-Voce shall be conducted for 140 marks by a committee consisting of HOD, Project Supervisor and an External Examiner.

Completion of internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship along with project work for next six months.

6.16 There shall be five skill-oriented courses offered during III semester to VII semester. Out of the five skill courses, two shall be skill-oriented programs related to the domain and these two shall be completed in second year. Of the remaining three skill courses, one shall necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

The student can choose between a skill advanced course being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies which are duly approved by the Internal Department Committee. The credits assigned to the skill advanced course shall be awarded to the student upon producing the Course Completion Certificate from the agencies/professional bodies.

The Internal Department Committee comprising Head of Department and two senior faculty shall evaluate the grades/ marks awarded for a course by external agencies and convert to the equivalent marks/grades.

7. Attendance Requirements:

- A student shall be eligible to appear for external examination and promoted to next semester, if he/she acquires a minimum attendance of 40% in every subject (Theory/Laboratory) being offered in that semester along with an aggregate attendance of 75% of all the subjects (Theory/Laboratory) offered in that semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee. However, a student who has been condoned for shortage of attendance need to acquire a minimum of 40% in each subject (Theory/ Laboratory) being offered in that semester.
- Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their examination registration shall stand cancelled.
- A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek re-admission for that semester when offered next.
- A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

8. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7

8.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project, if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In case of mandatory courses, internships, project work viva – voce, he/she should secure 40% of the total marks.

8.2 A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular and two supplementary examinations of I Semester.
One regular and one supplementary examination of II Semester.
One regular examination of III semester.

8.3 A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and four supplementary examinations of I Semester.
One regular and three supplementary examinations of II Semester.
One regular and two supplementary examinations of III Semester.
One regular and one supplementary examinations of IV Semester.
One regular examination of V Semester.

And if a student is detained for want of credits for particular academic year by sections 8.2 and 8.3 above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V Semester or VII Semester as the case may be.

8.4 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained.

8.5 Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

9. Course Pattern:

(i) A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.

When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

(ii) **With–holding of Results**:

If any case of indiscipline or malpractice is pending against candidate, the result of the candidate shall be with held and he/she will not be allowed/promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

(iii) Grading

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Table – Conversion into Grades and Grade Points assigned

Range in which the marks in the subject fall	Grade	Grade Points Assigned
≥ 90	S (Superior)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Below Average)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered. Same is the case with a student who obtains 'Ab' in end examination.

For **mandatory** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

10. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

(i) The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$\text{SGPA} = \frac{\sum_{i=1}^{n} C_i \times GP_i}{\sum_{i=1}^{n} C_i}$$

where, C_i is the number of credits of the ith subject and GP_i is the grade point scored by the student in the ith course.

(ii) The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$\text{CGPA} = \frac{\sum_{j=1}^{m} SGPA_j \times TC_j}{\sum_{j=1}^{m} TC_j}$$

where "$SGPA_j$" is the SGPA of the jth semester and TC_j is the total number of credits in that semester.

(iii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

(iv) While computing the SGPA, the subjects in which the student is awarded Zero grade points will also be included.

(v) *Grade Point:* It is a numerical weight allotted to each letter grade on a 10-point scale.

(vi) *Letter Grade:* It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree, he/she shall be placed in one of the following four classes.

Class Awarded	**CGPA Secured**
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

12. Gap Year:

Gap year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted by the College to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit the student(s) to avail the Gap Year.

13. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, and they will be in the academic regulations into which they get readmitted.

Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B. Tech from the date of commencement of class work, and they will be in the academic regulations into which the candidate is presently re-joining.

14. Minimum Instruction Days:
The minimum instruction days including exams for each semester shall be 90 days.

15. Medium of Instruction
The Medium of Instruction is **English** for all courses, laboratories, internal and external examinations and project reports.

16. Rules of Discipline

(i) Use of mobile phones with camera, in the campus is strictly prohibited.

(ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.

(iii) Students shall not bring outsiders to the institution or hostels.

(iv) Students shall not steal, deface, damage or cause any loss to the institution property.

(v) Students shall not collect money either by request or coercion from others within the campus or hostels.

(vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.

(vii) Use of vehicles by the students inside the campus is prohibited.

(viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.

(ix) Any material to be uploaded to social media sites need to be approved by Head of the Department concerned/Dean/Principal.

(x) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period

(xi) Dress Code

Boys : All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.

Girls : All the girls students shall wear saree/chudidhar with dupatta

17. Punishments for Malpractice cases – Guidelines

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S.No.	Nature of Malpractice/Improper conduct	Punishment
1	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the course of the examination).	Expulsion from the examination hall and cancellation of the performance in that course only.
2	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or	Cancellation of the performance in that course.

	writes to the examiner requesting him to award pass marks.	
3	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
4	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. In case of an outsider, he will be handed over to the police and a case shall be registered against him.
5	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
6	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeit of seat.
8	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case shall be registered against them.

	engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
9	Leaves the exam hall taking away answer script or intentionally tears up the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
10	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in S.No7 to S.No 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case shall be registered against them.
12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case shall be registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination including practicals and project work of

		that semester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
13	If any malpractice is detected which is not covered in the above S.No 1 to S.No 12 items, it shall be reported to the college academic council for further action and award suitable punishment.	
14	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.	

ACADEMIC REGULATIONS FOR B. TECH.(R20)
(LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2021-2022 and onwards)

1. Award of B.Tech. Degree

A student admitted in Lateral Entry Scheme (LES) will be declared eligible for the award of the B.Tech degree if he fulfils the following academic regulations:

(a) Pursues a course of study for not less than three academic years and in not more than six academic years.
(b) Registers for 121 credits and secures all *121* credits from III semester to VIII semester of Regular B. Tech. program.
(c) Students, who fail to fulfil the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.
(d) The regulations **3** to 7 are to be adopted as that of B. Tech. (Regular).

2. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7.

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar & Comprehensive viva-voce he should secure 40% in the internal evaluation.

ii. A student shall be promoted from third year to fourth year only if he/she fulfils the academic requirements of *40%* credits obtained till III-I from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and Two supplementary examinations of III semester.
One regular and one supplementary examinations of IV semester.
One regular examination of V semester.

And in case a student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of VII semester class work of next year.

3. Course Pattern

- The entire course of study is three academic years on semester pattern.
- A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
- When a student is detained due to lack of credits/shortage of attendance he may be re-admitted when the semester is offered after fulfilment of academic regulations, he shall be in the academic regulations into which he is readmitted.

4. The regulations **9** to **10** are to be adopted as that of B. Tech. (Regular).

5. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes:

Class Awarded	**CGPA Secured**	From the Aggregate Marks secured for 121 Credits (i.e II Year to IV Year)
First Class with Distinction	≥ 7.5	
First Class	≥ 6.5 < 7.5	
Second Class	≥ 5.5 < 6.5	
Pass Class	≥ 4.0 < 5.5	

6. The regulations **11** to **17** are to be adopted as that of B. Tech. (Regular). All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY: KURNOOL (AUTONOMOUS)

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE AND ENGINEERING- ARTIFICIAL INTELLIGENCE (CAI)

0 SEMESTER (I YEAR)									
S.No	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
20SIP01	Physical Activities - Sports, Yoga and Meditation, Plantation	MC	0	0	6	0	-	-	-
20SIP02	Career Counselling/Lectures by eminent people	MC	2	0	2	0	-	-	-
20SIP03	Orientation to all branches - career options, tools, etc.	MC	3	0	0	0	-	-	-
20SIP04	Orientation on admitted Branch - corresponding labs, tools and platforms	EC	1	0	4	0	-	-	-
20SIP05	Proficiency Modules & Productivity Tools	ES	2	1	2	0	-		-
20SIP06	Assessment on basic aptitude and mathematical skills	MC	1	0	4	0	-	-	-
20SIP07	Remedial Training in Foundation Courses	MC	2	1	2	0	-	-	-
20SIP08	Universal Human Values, painting, sculpture, pottery, music, dance	MC	1	0	2	0	-	-	-
20SIP09	Communication Skills - focus on Listening, Speaking, Reading, Writing skills, debates, enacting a play.	BS	2	1	2	0	-	-	-
		TOTAL	14	3	24	0			-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

PROGRAMMECURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE AND ENGINEERING- ARTIFICIAL INTELLIGENCE (CAI)

I SEMESTER (I YEAR)

S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30002	Mathematics-I	BS	3	0	0	3	40	60	100
A30004	Applied Physics	BS	3	0	0	3	40	60	100
A30501	Python Programming	ES	3	0	0	3	40	60	100
A30001	Communicative English	HS	3	0	0	3	40	60	100
A30301	Engineering Graphics and Computer aided Drafting	ES	1	0	4	3	40	60	100
A30006	Communicative English Lab	HS	0	0	3	1.5	40	60	100
A30008	Applied Physics Lab	BS	0	0	3	1.5	40	60	100
A30502	Python Programming Lab	ES	0	0	3	1.5	40	60	100
	TOTAL		13	00	13	19.5	320	480	800

II SEMESTER (I YEAR)

S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30011	Probability & Statistics	BS	3	0	0	3	40	60	100
A30005	Chemistry	BS	3	0	0	3	40	60	100
A30503	Data Structures Using C	ES	3	0	0	3	40	60	100
A33101	Fundamentals of AI	ES	3	0	0	3	40	60	100
A30302	Engineering Workshop	ES	1	0	4	3	40	60	100
A30009	Chemistry Lab	BS	0	0	3	1.5	40	60	100
A30504	Data Structures Lab	ES	0	0	3	1.5	40	60	100
A33102	Basic AI Lab	ES	0	0	3	1.5	40	60	100
A30031	Environmental Science	MC	2	0	0	0	100*	-	100*
	TOTAL		15	00	13	19.5	320	480	800

* The marks for Mandatory Courses are not considered for calculating SGPA

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
(AUTONOMOUS)

COURSE STRUCTURE

I - Semester

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30002 – MATHEMATICS – I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Solution of system of linear equations, Eigen values and Eigen vectors, Quadratic forms, Functions of single variable, Roll'stheorem, legranges mean value theorem, Cauchy mean value theorem, multivariable calculus, jacobian, maxima & minima. Evaluate the double and Triple integrals and its applications, Special functions. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program

Course Pre/co requisites

- Linear Algebra
- Differentiation
- Integration

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30002.1 Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.

A30002.2 Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.

A30002.3 Utilize mean value theorems to real life problems.

A30002.4 Familiarize with functions of several variables which is useful in optimization.

A30002.5 Apply important tools of calculus in higher dimensions and will become familiar with 2-dimensional coordinate systems.

A30002.6 Analyze 3- dimensional coordinate systems and utilization of special functions.

3. Course Syllabus

UNIT-I: Matrix Operations and Solving Systems Of Linear Equations

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Clayey-Hamilton theorem (without proof), finding inverse and power of a matrix by Clayey-Hamilton theorem, Diagonalisation of a matrix.

UNIT-II: Quadratic forms

Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof).

UNIT-III: Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers with three variables only**.**

UNIT-IV: Double Integrals

Double integrals, change of order of integration change of variable from Cartesian to polar coordinates, double integration in polar coordinates, areas enclosed by plane curves**.**

UNIT-V:TripleIntegrals and Special Functions

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

4. Books and Materials

Text Books:

1. Erwin Kreyszig, *Advanced Engineering Mathematics,* 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, *Higher Engineering Mathematics*, 44/e, Khanna publishers, 2017.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, 3/e, Alpha Science International Ltd., 2002.
2.George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus,* 13/e, Pearson Publishers, 2013.
3. Glyn James, *Advanced Modern Engineering Mathematics*, 4/e, Pearson publishers, 2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30004-APPLIED PHYSICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering. To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of Applied physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like physical optics, properties of dielectric and magnetic materials, electromagnetic theory, fiber optics, semiconductors, superconductivity are introduced. The applications of nano materials relevant to engineering branches are to be familiarized.

Course Pre/co-requisites

Bridge Course

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30004.1	Interpret the properties of light waves and its interaction of energy with the matter
A30004.2	Explain the principles of physics in dielectrics and magnetic materials
A30004.3	Apply electromagnetic wave propagation in different guided media
A30004.4	Calculate conductivity of semiconductors
A30004.5	Interpret the difference between normal conductor and super conductor
A30004.6	Elucidate the applications of nano materials

3. Course Syllabus

UNIT-I **12hrs**

Physical Optics

Interference: Superposition Principle-Interference of light -Interference in thin films by reflection -Newton's Rings-Determination of Wavelength-Engineering applications of Interference.

Diffraction-Fraunhofer Diffraction-Single slit, double slit, multiple slit diffraction-Diffraction Grating – Grating Spectrum -Determination of Wavelength-Engineering applications of Diffraction

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plate-Engineering applications of Polarization.

UNIT II

Dielectric and Magnetic Materials **8 hrs**

Dielectric Materials: Introduction to Dielectrics - Types of polarizations-Electronic and ionic polarizations with mathematical Derivations-orientation polarization(quantitative) -Frequency dependence of polarization-Lorentz(internal) field-Claussius -Mosotti equation-Applications of Dielectrics.

Magnetic Materials: Introduction to Magnetics--Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites and garnets and its applications.

UNIT III

Electromagnetic Waves and Fiber Optics **8 hrs**

Electromagnetic Waves: Divergence of Electric and Magnetic Fields-Gauss theorem for divergence-Curl of Electric and Magnetic Fields-Stokes theorem for curl- Maxwell's Equations-Electromagnetic wave propagation in non-conducting media-Poynting's Theorem.

Fiber Optics: Introduction-Total Internal Reflection-Construction of optical fibers, Critical angle of propagation-Acceptance Angle-Numerical Aperture-Classification of optical fibers-Fiber optic Communication system – Applications of optical fibers.

UNIT IV **6 hrs**

Semiconductors

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi - conductors –carrier concentration of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - carrier concentration of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect .

UNIT V

Superconductors and Nano materials **8 hrs**

Superconductors: Superconductors-Properties- Meissner effect-BCS Theory- AC & DC Josephson Effect -Types of Superconductors-High T_c superconductors-Applications.

Nanomaterials: Introduction-significance of nanoscale-Basic Principles of Nano materials – Properties of nanomaterials: Optical, Electrical, Thermal, Mechanical and Magnetic properties - Synthesis of nanomaterials: Top-down and bottom-up approach methods-Ball milling-chemical vapour deposition method-Applications of Nano materials.

4. Books and Materials

Text Book(s):

1.P.K.Palaniswamy, "Engineering Physics" ScitechPublications,2011.

2.B.K.Pandey and S.Chaturvedi, "Engineering Physics",Cengage Learning, 2012.

3.K.Thyagarajan, "Applied Physics", Mc Graw Hill Education(India) Private Limited,2020.

Reference Book(s):

1. Shatendra Sharma,Jyotsna Sharma, "Engineering Physics" Pearson Education,2018.

2. M.N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy "A Text book of Engineering Physics"-S.Chand Publications,11th Edition 2019.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30501 – PYTHON PROGRAMMING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course covers the basic programming and demonstrates fundamental programming techniques.

This course helps the students gaining the knowledge to write python language applications, mathematical and engineering problems. Helps to undertake future courses that assume this programming language as a background in computer programming**.**

Course Pre/Co-requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30501.1 Comprehend the fundamental concepts of computer hardware and problem solving Abilities.

A30501.2 Knowledge on the basic concepts of algorithms, flow charts and python programming.

A30501.3 Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.

A30501.4 Interpret the importance of functions in programming

A30501.5 Analyze and modularize the problem and its solution by using functions.

A30501.6 Ability to relate the concepts of strings, files and pre-processors to the real world Applications.

3. Course Syllabus

Introduction to Computers and Problem Solving Strategies -Introduction, Defining a Computer, History of Computers, Characteristics of Computers, Classification of Computers, Applications of Computers, Components and Functions of a Computer System, Concept of Hardware and Software, Central Processing Unit(CPU),I/O Devices, Computer Memory, Classification of Computer Software, Problem Solving Strategies, Program Design Tools.

Basics of Python Programming – Introduction to computer and python programming, History of python, Basics of python programming, python character set, tokens, data types, output function, multiple assignments, formatting numbers and strings.

Operators and Expressions -Arithmetic Operators, Comparison Operators, Assignment and In-place or Shortcut Operators, Unary Operators, Bitwise Operators, Shift Operators, Logical Operators, Membership Operators, Identity Operators, Operator Precedence and Associatively, Expressions in Python.

Decision statements -Boolean type, Boolean operators, numbers, strings with Boolean operators, decision making statements, conditional expressions.

Loop control statements -while loop, range function, for loop, nested loops, break and continue statements.

Data Structures -Sequence, Lists, Tuples, Sets, Dictionaries. Functional Programming -filter(), map(), reduce() , Python Strings.

Functions -Basics of functions, syntax, use of a function, local and global scope of a variable, return statement, recursive functions, lambda functions, parameters and arguments in functions.

Modules -The from…import statement, Name of Module, Making your own Modules, dir() function, The Python Module, Modules and Namespaces, Packages in Python, Standard Library modules, Globals(), Locals() and Reload(), Function Redefinition.

Exceptions -Introduction, Handling Exceptions, Multiple Except Blocks, else Clause, Raising Exceptions, finally Block, Re-raising Exception.

File Handling -Introduction, Need of file handling, text input and output files, seek function, binary files. Extracting data from a file and performing some basic operations on it.

4. Books and Materials

Text Book(s)

1. Programming and problem solving with python by Ashok NamdevKamthane,Amit Ashok Kamthane., McGraw-Hill Education.
2. Python programming using problem solving approach by ReemaThareja, Oxford.

Reference Book(s)

1. Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly, 2016.

OR

4.http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30001 – COMMUNICATIVE ENGLISH

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Pre/co-requisites:

The course has no specific pre/co-requisites

Course Outcomes(COs)

After the completion of the course, the student will be able to:

A30001.1 Remember the concepts which the student has learnt previously and identifying their connection

A30001.2 Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English

A30001.3 Apply grammatical structures to formulate sentences and correct word forms

A30001.4 Analyze discourse markers to speak clearly on a specific topic in informal discussions

A30001.5 Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.

A30001.6 Create a coherent paragraph interpreting a figure/graph/chart/table

Course Syllabus

UNIT – I

Listening: Listening for comprehension.
Speaking: Introducing oneself and describing people, places and objects.
Reading: Skimming and scanning pieces of information.
Writing: Summary writing.
Grammar and Vocabulary: Sentences and Clauses. Preposition, Parts of speech. One word substitutes.
Text: On the Conduct of Life: William Hazlitt. If: Rudyard Kipling

UNIT –II

Listening: Listening for purpose.
Speaking: Short structured talks on specific topics.
Reading: Identifyingand recognizing verbal techniques to link the ideas in a paragraph.
Writing: Mechanics of writing. (Punctuation)
Grammar and Vocabulary: Articles. Parts of speech. Synonyms.
Text: The Brook: Alfred Tennyson
Self-Improvement- How I Became a Public Speaker: George Bernard shaw

UNIT –III

Listening: Listening for global comprehension.
Speaking: Discussing and reporting on specific topics.
Reading: Reading for comprehension
Writing: Paragraph writing.
Grammar and Vocabulary: Noun-Pronoun Agreement. Subject-Verb Agreement. Antonyms.
Text: The Death Trap: Saki
Time Management: On Saving Time: Seneca

UNIT –IV

Listening: Predicting conversation/transactional dialogues
Speaking: Role Plays
Reading: Interpreting the graphic elements in the text.
Writing: Information Transfer. Letter writing (formal and Informal). Essay Writing
Grammar and Vocabulary: Misplaced Modifiers. Degrees of Comparisions.
Text: ChinduYellamma
Innovation: Muhammad Yunus

UNIT – V

Listening: Listening comprehension.
Speaking: Formal Oral Presentations.
Reading: Reading for comprehension
Writing: Summary writing. Technical Report writing.
Grammar and Vocabulary: Spotting the errors. Idioms and Phrases.
Text: Politics and the English Language: George Orwell
The Dancer with a White Parasol: Ranjana Dave

4. Books and Materials

Text Book:
Language and Life:A Skills Approach, Orient BlackSwan, Hyderabad. 2018.

Reference Books:

1.Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2.Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3.Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30301-ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	4	14	0	56	3	40	60	100

1. Course Description

Course Overview

This course teaches the practices for accuracy and clarity in presenting the technical information in the form of drawings and the utility of drafting & modelling packages in orthographic and isometric drawings. It enables the student to understand and develop engineering imagination essential for successful design and familiarize how industry communicates technical information.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30301.1 Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.

A30301.2 Apply orthographic projection concepts to draw projections of points, lines, planes and solids.

A30301.3 Apply development concepts to draw development of surfaces of simple solids.

A30301.4 Apply isometric projection concepts to draw isometric projections of right regular solids

A30301.5 Apply orthographic projection concepts to convert isometric view to orthographic views.

A30301.6 Make use of AutoCAD Software to draw 2D diagrams of various objects

3. Course Syllabus

PART -A

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Curves used in Engineering Practice:

a) Conic Sections- Ellipse, Parabola & Hyperbola – General method only.

b) Rectangular Hyperbola – General method only.

c) Cycloid, Epicycloids and Hypocycloid

UNIT II

Projection of Points: Principles of Orthographic Projection, Conventions, First and Third Angle Projections, Projections of Points.

UNIT III

Projection of Lines: Projection of Lines in simple positions, inclined to one or both planes, Finding True lengths.

Projections of Planes: Projections of regular Plane surfaces in simple position, inclined to one plane.

UNIT IV

Projections of Solids: Projections of Regular Solids in simple position, axis inclined to one of the planes.

Developments of Solids: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid and Cone.

UNIT V

Isometric and Orthographic Projections: Principles of Isometric Projection –Isometric Scale – Isometric Views– Isometric Views of Lines, Plane Figures, Simple Solids(Cube, Prism, Cone & Cylinder).Conversion of Isometric view to Orthographic Views.

PART –B (PRACTICEONLY)

Introduction to Computer Aided Drafting:

Introduction to AutoCAD Software, setting of units and drawing limits, producing drawings by using Absolute, Relative and Polar coordinate input entry methods, drawing simple figures, applying dimensions to objects and Editing options

4. Books and Materials

Text Book(s):

K.L. Narayana and P. Kannaih ,*Engineering Drawing*, Scitech Publications, 2nd edition,2011.

Reference Book(s)

1. N.D. Bhatt*, Engineering Drawing,* Charotar Publishing House,53rd Edition2016.
2. K. Venugopal,*Engineering Drawing and Graphics,* New age International Publishers,5th edition, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30006 – COMMUNICATIVE ENGLISH LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

A well equipped and well maintained language lab is maintained in the college to hone the communication skills of students. The students are trained in developing their communication skills through this system. The language lab lessons engaged in this college facilitates classroom engagement and interaction via computer based exercises and activities to maximize language immersion. It focuses on acquiring and developing the four main language skills of a student, namely; listening, speaking, reading and writing along with adequate grammar and vocabulary building exercises as well.

Course Objectives:

1. Students will be exposed to a variety of self-instructional, learner friendly modes of language learning
2. Students will cultivate the habit of reading passages from the computer monitor. Thus Providing them with the required facility of ace computer based competitive exams like GRE, TOEFL, and GMAT etc.
3. Students will learn better pronunciation through stress, intonation and rhythm
4. Students will be trained to use language effectively to face interviews, group discussions, Public speaking
5. Students will be initiated into greater use of the computer in resume preparation, Report writing, format making etc

Course Pre/co requisites

A30001- Communicative English

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30006.1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
A30006.2	Apply communication skills through various language learning activities
A30006.3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
A30006.4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
A30006.5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
A30006.6	Improve upon speaking skills over telephone, role plays and public speaking

3. Course Syllabus

List of topics to be covered:

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons
4. JAM
5. Small talks on general topics (Hypothetical situations)
6. Debates
7. Situational dialogues –Greeting and Introduction
8. Reading passages (TOEFL, IELTS)- Summarizing and Note making.
9. Vocabulary Building
10. Asking for Information and Giving Directions
11. Information Transfer
12. Non-verbal Communication –Dumb Charades
13. Oral Presentations
14. Précis Writing and Paraphrasing
15. Spotting errors

4. Books and Materials

Text Books:

1. *Language and Life:A Skills Approach.* Orient BlackSwan: Hyderabad. 2018.
2. Rizvi, M. Ashraf. Effective Technical Communication. Noida:McGraw-Hill Education. 2009.

Reference Books:

1. Dhanavel, S P. English for Communication Skills for Students of Science and Engineers. New Delhi: Mittal Books India. 2009.
2. Lewis, Norman. Word Power made Easy. Haryana:Penguin Random House India. 2009.
3. Mohan, Krishna and N P Krishna. *Speaking English Effectively.* India: MacMillan.2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30008 – APPLIED PHYSICS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course imparts practical and conceptual knowledge of Physics applicable to the domain of civil and mechanical engineering. The laboratory work of the course is aimed to ensure that the student comprehends the concepts of Physics through demonstrable and executable experiments. This course will enable the student to determine the thickness of paper, radius of curvature of plano-convex lens, wavelength of different colors of white light, dispersive power of grating, self -Inductance of the coil, numerical aperture and acceptance angle of an optical fiber, resistivity and energy gap of a semiconductor, study of magnetic field along the axis of a current carrying coil, diffraction of light through single slit and measurement of resistance by varying temperature.

Course Pre/co-requisites:

A30004- Applied Physics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30008.1	Operate optical instruments like Travelling microscope and spectrometer
A30008.2	Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
A30008.3	Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
A30008.4	Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
A30308.5	Evaluate the acceptance angle of an optical fiber and numerical aperture
A30308.6	Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor

3. Course Syllabus

(Any 12 of the following)

1. Determine the thickness of the paper using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Diffraction due to single slit
5. Dispersive power of a diffraction grating

6. Magnetic field along the axis of a circular coil carrying current

7. Determine the self-inductance of the coil (L) using Anderson's bridge

8. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)

9. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle

10. To determine the resistivity of semiconductor by Four probe method

11. To determine the energy gap of a semiconductor

12. Measurement of resistance with varying temperature

13. Determination of dielectric constant by charging and discharging method.

14. LASER: Determination of wavelength of laser source by using diffraction grating

15. LASER: Determination of Particle size (hair) by using laser source

4. Laboratory Equipment/Software/Tools Required

1. Spectrometer
2. Travelling Microscope
3. Stewart-Gee's Apparatus
4. Single slit
5. Anderson's Bridge
6. B-H Curve
7. Optical Fiber Kit
8. Four Probe kit
9. Energy gap kit
10. Thermistor

5. Books and Materials

Text Book(s):

S.Balasubramanian, M.N.Srinivasan "*A Text book of Practical Physics*"- S. Chand Publishers, 2017

Reference Book(s)

https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30502 – PYTHON PROGRAMMING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This lab helps the students gaining the knowledge to write python language applications, mathematical and engineering problems. Helps the students to apply python programming libraries in solving the computational problems.

Course Pre/Co-requisites

A30501 – Python Programming

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30502.1 Design solutions to mathematical problems & Organize the data for solving the Problem.

A30502.2 Understand and implement modular approach using python

A30502.3 Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc.

A30502.4 Understands about files and its applications.

A30502.5 Develop real-world applications, files and exception handling provided by python

A30502.6 Select appropriate programming construct for solving the problem

3. Course Syllabus

Experiment-1 a) Running instructions in Interactive interpreter and a Python Script.
b) Write a program to compute distance between two points taking input from the user

Experiment-2 a) Write a Program for checking whether the given number is a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . ,1/10

Experiment-3 a) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Experiment-4 a) Write a Python program to check if a number is a perfect number.
b) Write a Python program to check if a number is a strong number.

Experiment-5 a) Write a program to count the number of characters in the string and store them

in a dictionary data structure.
b) Python program to split a string based on a delimiter and join the string using another delimiter.

Experiment-6 a) Python Program to Convert Decimal to Binary, Octal and Hexadecimal without using built in methods.
b) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

Experiment-7 a) Write a function dups to find all duplicates in the list.
b) Write a function cumulative product to compute cumulative product of a list of numbers.

Experiment-8 a) Write a function reverse to reverse a list. Without using the reverse function.
b) Write function to compute gcd, lcm of two numbers using recursion.

Experiment-9 a) Write a program to perform addition of two square matrices.
b) Write a program to perform multiplication of two square matrices.

Experiment-10 a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

4. Laboratory Equipment/Software/Tools Required

Open source scripting language (Spyder, pyscripter and etc), Python IDLE, Anaconda

5. Books and Materials

Text Book(s)

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition, O'Reilly, 2016.
Or
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Algorithmic Problem Solving with Python, John B. Schneider ,Shira Lynn Broschat, Jess Dahmen.
3. Think in Python, Allen Downey, Green Tea Press, Needham, Massachusetts.

Reference Book(s)

1) Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016.
2) DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
(AUTONOMOUS)

COURSE STRUCTURE

II - Semester

COURSE STRUCTURE

A30011 – PROBABILITY AND STATISTICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Descriptive statistics and methods for data science, Probability, Probability distributions, Estimation and Testing of hypothesis, large sample tests, and Small sample tests. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Pre/co requisites

This course has no pre/co-requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30011.1 Adopt correlation methods and principle of least squares, regression analysis.

A03011.2 Apply discrete and continuous probability distributions.

A30011.3 Classify the concepts of data science and its importance.

A30011.4 Interpret the association of characteristics and through correlation and regression tools.

A30011.5 Design the components of a classical hypothesis test.

A30011.6 Infer the statistical inferential methods based on small and large sampling tests.

3. Course Syllabus

UNIT-I

Descriptive statistics Introduction, Measures of Variability (dispersion) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, method of least squares, regression lines, regression coefficients and their properties.

UNIT-II

Probability: Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT-III

Probability distributions: Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties**.**

UNIT-IV

Estimation and Testing of hypothesis, large sample tests : Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems.

UNIT-V

Small sample tests: Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

4. Books and Materials

Textbooks:

1. Miller and Freunds, *Probability and Statistics for Engineers,*7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics,* 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

2. S. Ross, *A First Course in Probability,* Pearson Education India, 2002.
3. W. Feller*, an Introduction to Probability Theory and its Applications*, 1/e, Wiley, 1968.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30005 – CHEMISTRY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course acquaints the students with different softening methods and develops the study of electrochemical cells, types of batteries and their applications, Interactions between them, emphasizing their properties and indicating some applications. It deals with more advanced topics, familiarises engineering material, their properties and applications which provides the student to impart knowledge on corrosion and its significance, to explain nano and Smart materials and their uses.

Course Pre/Co requisites

Bridge Course

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A30005.1 To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box.

A30005.2 To differentiate between pH metry, Potentiometric and conductometric titrations.

A30005.3 Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.

A30005.4 Understand the principles of different analytical instruments and explain their applications.

A30005.5 Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.

A30005.6 Explain of different types of colloids, their preparations, properties and applications

3. Course Syllabus

Unit – 1 : Structure and Bonding Models: Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2 , applications to hydrogen, Particle in a box model , molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. calculation of bond order, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting in octahedral and tetrahedral environments-Applications of CFT (magnetic properties and colour).

Unit- 2: Electrochemistry and Applications: Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems. Photovoltaic cell &photo galvanic cells – working and applications. Primary cells – Zinc-air battery, alkali metal sulphide batteries, Secondary cells – lead acid and lithium batteries. Fuel cells - Hydrogen-oxygen & Methanol fuel cells – working and applications.

Unit - 3: Polymer Chemistry: Introduction to polymers, Basic Concepts, Chain growth and Step growth polymerization, copolymerization (stereo specific polymerization) with specific examples. Mechanisms of polymer formation. Plastomers: Thermoplastics and Thermosetting, Preparation, properties and applications of – Bakelite, Nylons. Elastomers: Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline – mechanism of conduction and applications.

Unit – 4: Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometer, Conductometry, UV- spectroscopy, IR Spectroscopy. Chromatography- Basic principle- TLC- Separation of organic mixtures

Unit – 5: Nano materials and Colloidal chemistry:
Nano materials : Introduction to nano materials: Nano particles, nano clusters, (CNT's) and nano wires. Chemical synthesis of nano materials- Sol gel method. Characterization: principle and application of scanning electron microscope (SEM) and Transmission Electron Microscope (TEM).
Colloidal chemistry: Introduction to colloidal chemistry - colloidal, Micelle formation, synthesis of colloids (any two methods with examples), properties and applications.

4. Books and Materials

Text Books:

1. Jain and Jain, *Engineering Chemistry,* 16/e, Dhanpat Rai,2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' *Physical Chemistry,* 10/e, Oxford University Press,2010.
3. K N Jayaveera, G V Subba Reddy and C Rama Chandraiah, *Engineering Chemistry* 1/e Mc Graw Hill Education (India) Pvt Ltd, New Delhi 2016
4. B.K Sharma *Engineering Chemistry,* Krishna Prakashan, Meerut.

Reference Books:

1. J. D. Lee, *Concise Inorganic Chemistry,* 5/e, Oxford University Press,2008.
2. Skoog and West, *Principles of Instrumental Analysis,* 6/e, Thomson,2007.
3. Ben L. Feringa and Wesley R. Browne, *Molecular Switches,* 2/e, Wiley-VCH,2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30503 – DATA STRUCTURES USING C

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course covers data structures and algorithms.Topics include space and time complexity, analysis, static data and dynamic data structures. The learner will enrich their logical abilities by handling data in organised way. The students can choose their career path as software engineers.

Course Pre/Corequisites

- C
- Mathematics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30503.1	Learn to choose appropriate data structure as applied to specified problem definition.
A30503.2	Design and analyse linear and non-linear data structures.
A30503.3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
A30503.4	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
A30503.5	Develop programs for efficient data organisation with reduce time complexity.
A30503.6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

3. Course Syllabus

Unit-1
Introduction to Problem Solving Using C
Introduction: Structure of C Program, Identifiers, Basic data types, Variables, Constants, I/O functions , Operators, Selection Statements – if and switch statements, Repetition statements – while, for, do-while statements, other statements related to looping – *break, continue,goto*,Arrays-Operations
Unit-2
Solving Problems using arrays, Functions, Strings, Pointers.
Linear Data Structures
Stacks: Introduction-Definition-Representation of Stack-Operations on Stacks- Applications of Stacks.

Unit-3
Queues: Introduction, Definition- Representations of Queues- Various Queue Structures-Applications of Queues.
Unit-4
Linked lists:

Definition- Single linked list- Circular linked list- Double linked list- Circular Double linked list.
Sorting: Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merge Sort, Quick Sort
Unit-5
Search: Sequential Search, Binary Search, Hashing, time complexity.
Trees and Graphs:
Trees: examples, Binary Trees, Tree Traversals, Binary Search Trees.
Graph: BFS and DFS.

4. Books and Materials

Text Book(s)

1. C & Data Structures, by farouzan
2. Fundamentals of Data Structures in C – Horowitz, Sahni, Anderson- Freed, Universities Press, Second Edition.

.

Reference Book(s)

1.B.W. Kernignan and Dennis M.Ritchie, The C Programming Language, (PHI), 2nd Edition 2003.

2.Jean Paul Tremblay and Paul G.Sorenson[2007], An Introduction to DataStructures With Applications, TMH

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A33101 –FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

AI provides an overview of AI concepts and workflows, machine learning, deep learning, and performance metrics. You'll learn the difference between supervised, unsupervised, and reinforcement learning; be exposed to use cases, and see how clustering and classification algorithms help identify AI business applications.

Course Pre/Co-requisites

- Mathematics -1
- Computer Programming
- Problem Solving and Algorithms
- Probability and Statistics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A33101.1	An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
A33101.2	An ability to design, implement and evaluate a system / computer based system process, component or program to meet desired needs
A33101.3	An ability to identify, formulate and solve engineering problems using the concepts of Artificial Intelligence.
A33101.4	Design and conduct experiments as well as analyze and interpret data using Machine Learning Algorithms
A33101.5	An ability to use current techniques and skills necessary for computing and engineering practice
A33101.6	Get familiarized with the tools mandatory for handling problem solving techniques

3. Course Syllabus

Unit 1:

Introduction to Artificial Intelligence and Machine Learning. Linear Regression, Logistic Regression. Euclidean Distance metric and Mahalanobis distance metric, Eigen values, Eigen matrices, Variance, Covariance matrix, Singular Value Decomposition, Principal Component Analysis and problems.

Unit 2:

Classification Problem, Naïve Bayesian Classifier, Support Vector Machines, Clustering Problem, Similarity measures, K-Means Algorithm, DBSCAN Algorithm.

Unit 3:

Knowledge representation issues – Predicate logic – logic programming – Sematic nets, Frames and inheritance, constraint propagation –Representing Knowledge using rules – Rules based deduction system.

Unit 4:

Introduction- Foundation and history of AI, AI Problems and techniques, Problem spaces and searches, Blind search strategies; Breadth first, Depth first – Heuristic search techniques Hill climbing, Best first – A* algorithm AO* algorithm.

Unit 5:

Fuzzy Logic, Fuzzy Sets, Fuzzy Classification. Equivalence Relation and Equivalence Classes, Rough Sets and Classification using Rough Sets. Introduction to Genetic Algorithms.

4. Books and Materials

Text Book(s)

1. The Elements of Statistical Learing – Trevor Hastie, Robert Tibshirani and Jerome Friedman, Second Edition, Springer
2. Rich and Knight – Artificial Intelligence

Reference Book(s)

1. Prateek, J.: Artificial Intelligence with Python, pp. 14–16. Packt Publishing, Birmingham (2017).
2. Husain, Amir. The sentient machine: The coming age of artificial intelligence. Simon and Schuster, 2017.
3. Kaplan, Jerry. Artificial intelligence: What everyone needs to know. Oxford University Press, 2016.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30302 – ENGINEERING WORKSHOP

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	3	40	60	100

1. Course Description

Course Overview

This course introduces students to the basic concepts related to Engineering workshop and also imparts the knowledge about usage of the tools. This course familiarizes students with woodworking, welding, sheet metal operations, fitting and electrical house wiring skills. This knowledge enables the students to fabricate, manufacture or work with materials.

Course Pre/co-requisites

This course has no Pre/co-requisites

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30302.1 Apply wood working skills to make products.

A30302.2 Perform metal cutting operations in the fitting section to make models.

A30302.3 Perform simple welding operations to join to metal pieces.

A30302.4 Apply sheet metal working skills to make required models.

A30302.5 Evaluate the performance analysis of various pumps and turbines.

A30302.6 Perform general maintenance works on own at house/ work place.

3. Course Syllabus

1. **FittingTrade–**Making ofaL-fitfromthegivenM.SFlatmaterialpiece.
2. **FittingTrade–**Making ofaSquare jointfromthegivenM.SFlatmaterialpiece.
3. **CarpentryTrade–**Making of acrosslapjointasperspecification.
4. **CarpentryTrade-**Tomakeadovetailjointasperspecification.
5. **TinSmithy**–Making ofanopenscoopwiththegivensheetmetal
6. **TinSmithy**–Making ofasquare tinwiththegivensheetmetal
7. **Foundry:**Preparation ofasandmouldusingasinglepiecepattern

8. **Welding**: Preparation of a single V butt joint
9. **Welding**: Preparation of single lap joint
10. **House Wiring:** One bulb connected by oneone-way switch
11. **House Wiring:** One bulb connected by twoTwo- way switches
12. **House Wiring:** Staircasewiring
13. **House Wiring:**Tubelightwiring
15. **House Wiring:** Go-DownWiring

4. Laboratory Equipment/Software/Tools Required

1. Fitting bench wise
2. Hack saw frame
3. Carpentry benchwise
4. Jack plane
5. Snip tool
6. Nose player
7. Cope & Drag
8. Sprue
9. Welding machine
10. House wiring set up

5. Books and Materials

Text Book(s)

P.N. Rao, *Manufacturing Technology*, Volume-I, Tata McGraw Hill, 4th edition, 2013.

Reference Book(s)

1. Schmid and Kalpakjin, *Manufacturing Technology*, Pearson education, 7thedition, 2014.

2. P. N. Rao, *Manufacturing Technology*, *Foundry forming and welding*, Volume-I, McGraw Hill education, 5th edition, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30009 – CHEMISTRY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

- This course introduces the basic concepts of practical understanding of the redox reactions which is the foundation for the Engineering discipline.
- The emphasis of this course is laid on the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineers theseto suit diverse applications.
- Learn practical understanding of Potentiometric titrations

Course Pre/co requisites:

A30005- Chemistry

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30009.1	Understand the determine the cell constant and conductance of solutions
A30009.2	Prepare advanced polymer materials.
A30009.3	Measure the strength of an acid present in secondary batteries
A30009.4	Understand and apply the pH metric titrations.
A30009.5	Verify Lambert-Beer'slaw
A30009.6	Potentiometry - determination of redox potentials and EMFs

3. Course Syllabus

1. Determination of cell constant and conductance of solutions
2. Conduct metric titrations of Strong acid Vs Strong base
3. pH metric titration of weak acid vs. strong base
4. Potentiometry - determination of redox potentials and EMFs
5. Estimation of Ferrous Iron by Dichometry
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer (Bakelite)
8. Verify Lambert-Beer's law
9. Determination of copper by colorimetry
10. Thin layer chromatography
11. Identification of simple organic compounds by UV-Visible Spectral analysis
12. Preparation of nanomaterials by Precipitation method.

4. Laboratory Requirements

1. Conductivity meter
2. p^H meter
3. Potentiometer
4. Colorimeter
5. TLC chamber
6. UV- Spectrometer

5. Books and Materials **Reference Book(s):**

1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's *Quantitative Chemical Analysis* 6/e, Pearson publishers (2000).

2. N.K Bhasin and Sudha Rani *Laboratory Manual on Engineering Chemistry* 3/e, Dhanpat Rai Publishing Company (2007).

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30504 – DATA STRUCTURES LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This Laboratory covers data structures and algorithms. Programs include static data and dynamic data structures along with analysis of time and space complexity. The learner will enrich their logical abilities by handling data in an organised way. The students can choose their career path as software engineers.

Course Pre/Corequisites

A30503- Data Structures Using C

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

Learn to choose appropriate data structure as applied to specified problem definition.

After completion of the course, the learner will be able to:

A30504.1	Learn to choose appropriate data structure as applied to specified problem definition.
A30504.2	Design and analyse linear and non-linear data structures.
A30504.3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
A30504.4	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
A30504.5	Develop programs for efficient data organisation with reduce time complexity.
A30504.6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

3. Course Syllabus

PART A: Introduction

Task – 1	Write a program to sort the number of elements using sorting by exchange. Write a program to sort the characters in a string using sorting by exchange.
Task – 2	Write a program to sort numbers using insertion sort. Write a program to sort the elements of an array using Selection Sort.
Task – 3	Write a program to convert infix expression to postfix expression and evaluate postfix expression.

Linked List, Stack, Queue

Task – 4	Write a program to implement stack, queue, circular queue using arrays and linked lists on employee details.
Task– 5	Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list
Task– 6	Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.
Task– 7	Write a program to remove duplicates from ordered and unordered arrays.
Task– 8	Write a program to implement quick sort using non-recursive and recursive approaches.
Task– 9	Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.
Task– 10	Write a program to implement depth first search and breadth first search on graphs.

4. Laboratory Equipment/Software/Tools Required

C Compiler, GCC, Dev C++, Turbo C Editor

5. Books and Materials

Text Book(s)

1. Herbert Schildt. *The Complete Reference C*. Fourth Edition, Mc-GrawHillEduction, 2008.
2. DebasisSamanta. *Classic Data Structures*. Second Edition, PHI,2009.

Reference Book(s)

1. Horowitz, Sahni, Anderson Freed. Fundamentals of Data Structures in C.2nd Edition, Universities Press.
2. Ron S.Gottfried, Programming with C, 3rd Edition, TMH, 2011.
3. G A VijayalakshmiPai. *Data Structures and Algorithms*. TMH, 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A33102 - BASIC ARTIFICIAL INTELLIGENCE LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

The aim of this Laboratory is to create computer programs that can solve problems by learning experiences. This course covers binarization, normalization data pre processing technique to apply on sample data. From this course, the student acquires fundamental knowledge on AI techniques to solve general purpose problems. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

Course Pre/Co-requisites

Mathematics -1
Computer Programming
Problem Solving and Algorithms
Probability and Statistics
Artificial Intelligence

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A33102.1	Execute statistical problems to produce appropriate solutions
A33102.2	Categorize the problem for selection of an appropriate algorithm
A33102.3	Compare computational complexity of AI problems for better efficiency
A33102.4	Demonstrate various AI algorithms based on empirical and theoretical proofs for performance statistics
A33102.5	An ability to use current techniques and skills necessary for computing and engineering practice
A33102.6	Get familiarized with the tools mandatory for handling problem solving techniques

3. Course Syllabus

1. Apply Binarization data pre processing technique on sample data.
2. Apply Mean Removal data pr eprocessing technique on sample data.
3. Apply Min and Max scaling on sample data.
4. Apply normalization data pre processing technique on real estate data.
5. How to encode the labels and show the performance of encode dlabels.
6. Using Pandas perform the following
    a. Handling.
    b. Slicing.
    c. Extracting statistics from Time Series Data.
7. Use the sklearn.svm package and implement classification.
8. Using python program build a Linear Regressor.

4. Laboratory Equipment/Software/Tools Required

Open source scripting language, Python IDLE, Anaconda

5. Books and Materials

Text Book(s)

1. S. Russel and P. Norvig, *Artificial Intelligence – A Modern Approach*, 4th edition, Pearson Education,2020.

Reference Book(s)

1. Elain Rich and Kevin Knight, *Intelligence*, 3rd edition, TMH, 2017.
2. David Poole, Alan Mackworth, Randy Goebel, *Computational Intelligence: a logical approach*, Oxford University Press, 2012.

COURSE STRUCTURE
A30031-ENVIRONMENTAL SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100*	---	100*

1. Course Description

Course Overview

This course is designed to create environmental awareness and consciousness among the present generation to become environmental responsible citizens. This course covers multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources; Ecosystems; Biodiversity and its conservation; Environmental Pollution; Social Issues and the Environment. Manufacture of Eco-friendly products, awareness on environment to the people; Human Population and the Environment; pollution control acts and Field Work. This course is divided into five chapters for convenience of academic teaching followed by field visits.

Course Pre/co requisites

This course has no pre/co-requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A30031.1	Solve environmental problems through higher level of personal involvement and interest.
A30031.2	Apply ecological morals to keep up amicable connection among nature and human beings.
A30031.3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
A30031.4	Apply environmental laws for the protection of environment and wildlife.
A30031.5	Influence society in proper utilization of goods and services.

3. Course Syllabus

UNIT -I

Introduction: Environment Definition, The multidisciplinary nature of environmental studies, Scope and importance-Need for public awareness. Natural Resources: Classification of resources: Renewable and Non-renewable resources. Forest resources: Uses and over exploitation of forests. Dams and their effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water, conflicts over water. Food resources: Problems with Chemical fertilizers and pesticides. . Energy resources: Renewable energy resources: solar energy, wind energy and geothermal energy. Role of individual in conservation of natural resources

UNIT – II

Ecosystems: Ecosystem Definition. Structure of an ecosystem: Producers, Consumers and Decomposers. Function of ecosystems: Food chains, food webs and energy flow in an ecosystem. Ecological pyramids: Pyramid of number, Pyramid of biomass and Pyramid of energy. Introduction, types, characteristic features ,structure and function of the following ecosystem. A) Forest ecosystem B) Dessert system C)Aquatic ecosystems(ponds,rivers,ocean,estuaries).

Biodiversity and Its Conservation: Introduction and definition. Levels of biodiversity**,** Bio geographical classification of India ,Values of biodiversity(Consumptive value, productive value ,Social ,ethical and aesthetic value)Hot spots and Threats to biodiversity. In-situ and Ex-situ conservation of biodiversity.

UNIT-III

Environmental Pollution: Definition, causes, effects and control measures of Air Pollution, Water pollution, Soil pollution, Nuclear hazards, Global warming, Acid rains and Ozone layer depletion. Role of an individual in prevention of pollution. Solid waste management and Disaster management: floods, earthquakes, cyclone and landslides.

UNIT-IV

Social Issues and the Environment: Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion, crazy consumerism. Water conservation, Rainwater harvesting and environmental ethics. Environment Protection Act(Air, water, soil and wild life protection act)-Public awareness.

UNIT -V

Human population and the Environment: population growth, variation, value education-HIV/AIDS-women and child welfare-Role of IT in environment and human health. Fieldwork-visit to a local area to document environmental assets.

- Visit to local polluted site – Urban/Rural/Industrial /Agricultural).
- Study of common plants , insects , birds .
- Study of simple ecosystem –pond, river, estuaries)

4. Books and Materials

Text Books:

1. Anubha Kaushik, C.P. Kaushik,*Environmental Studies*, 4th edition, New age international publishers, 2014.
2. Anil K DE., Environmental Chemistry, New Age International Publication, 9th Edition

Reference Books:

1. ErachBharucha, *Textbook of Environmental Studies for Undergraduate Courses*. 1st edition, Universities press, 2005.
2. Benny joseph,*Environmental studies*, 3rd edition, McGraw Hill Education (India) Private Limited, 2018.

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE ANDENGINEERING - ARTIFICIAL INTELLIGENCE (CAI)

III SEMESTER (II YEAR)

Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30019	Managerial Economics & Financial Analysis	HS	3	0	0	3	40	60	100
A30508	Database Management Systems	PC	3	0	0	3	40	60	100
A30512	Design and Analysis of Algorithms	PC	3	0	0	3	40	60	100
A30421	Digital Electronics	ES	3	0	0	3	40	60	100
A30018	Numerical Methods	BS	3	0	0	3	40	60	100
A30509	Database Management Systems Laboratory	PC	0	0	3	1.5	40	60	100
A30422	Digital Electronic Laboratory	PC	0	0	3	1.5	40	60	100
A30516	Design and Analysis of Algorithms Laboratory	PC	0	0	3	1.5	40	60	100
A30511	Android Application Development	SC	1	0	2	2	40	60	100
A30035	Universal Human Values	MC	2	0	0	0	100*	0	100*
	TOTAL		18	0	11	21.5	360	540	900

* The marks for Mandatory Courses are not considered for calculating SGPA

IV SEMESTER (II YEAR)

Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A33106	Data Science	PC	3	0	0	3	40	60	100
A30507	Object Oriented Programming through Java	PC	3	0	0	3	40	60	100
A30016	Discrete Mathematics	BS	3	0	0	3	40	60	100
A30514	Operating Systems	PC	3	0	0	3	40	60	100
A30515	Software Engineering	PC	3	0	0	3	40	60	100
A33107	Data Science Laboratory	PC	0	0	3	1.5	40	60	100
A30510	Object Oriented programming through Java Laboratory	PC	0	0	3	1.5	40	60	100
A30518	Operating Systems Laboratory	PC	0	0	3	1.5	40	60	100
A33108	Unix & Shell Programming	SC	1	0	2	2	40	60	100
TOTAL			16	00	11	21.5	360	540	900
Internship 2 Months (Mandatory) during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

R20-COURSE STRUCTURE

III – SEMESTER

COURSE STRUCTURE

A30019 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is designed in such a way that it gives an overview of concepts of managerial economics financial analysis. Managerial economics enables students to understand micro environment in which markets operate how price determination is done under different kinds of competitions. Financial analysis gives clear idea about concepts and conversions accounting procedures along with introducing students to fundamentals of ratio analysis and interpretation of financial statements.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30019.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization

A30019.2 Analyze the demand, production, cost and break even to know interrelationship among variables and their impact

A30019.3 Classify the market structure to decide the fixation of suitable price

A30019.4 Apply capital budgeting techniques to select best investment opportunity

A30019.5 Analyze and prepare financial statements to assess financial health of business.

3. Course Syllabus

UNIT I

Managerial Economics: Definition, Nature and Scope of Managerial Economics, Relation with other disciplines –Demand Analysis: Types, Determinants, Laws, GST-Implications. Elasticity of Demand: Types, Measurement and Significance, methods of demand Forecasting.

UNIT II

Production function: Isoquants and Iso-costs, MRTS, Least Cost Combination of Inputs. Laws of Production. Cost & Break-Even Analysis: Cost concepts, Break-even Analysis (BEA)-Determination.

UNIT III

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly.Pricing: Objectives, Policies, Methods, Cross Subsidization

UNIT IV

Capital: significance, Types, Components, Factors, Methods and sources of raising finance. Capital Budgeting: Nature and scope, features, Methods - Payback Method, Accounting Rate of Return (ARR), Net Present Value, Profitability Index, Internal rate of return.

UNIT V

Accounting Principles: Concepts, Conventions, Double Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts with simple adjustments. Financial Analysis through Ratios: Importance, types- Liquidity Ratios, Activity Ratios, Turnover Ratios and Profitability ratios.

4. Books and Materials

Text Book(s)

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, TMH, India, 2011.

Reference Book(s)

1. Varshney &Maheswari, *Managerial Economics*, Sultan Chand, 2003.
2. Ambrish Gupta, *Financial Accounting for Management: An Analytical Perspective*, 4th Edition, Pearson Education, New Delhi, 2011.

COURSE STRUCTURE

A30508– DATABASE MANAGEMENT SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course enlightens the learners with the comprehensive concepts of database and its applications. It covers various data models, Entity Relationship diagrams, SQL queries, transactions and indexing techniques. The learners of this course can choose the domain of Data Engineering and can opt their carrier path in database administration or data analytics.

Course Pre/corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30508.1 Apply suitable data model for given application

A30508.2 Construct optimized SQL queries to solve real time problems

A30508.3 Apply suitable normal form to eliminate data redundancy

A30508.4 Use suitable transaction model to avoid Deadlock

A30508.5 Choose appropriate index structure to improve performance

3. Course Syllabus

UNIT I

Introduction-Basics of Database System and its Applications, Database System Principles. Data View - Data Abstraction, Instances and Schemas, Data Models, Database Languages, Database Architecture, Database Users and Administrators, Introduction to Database design

UNIT II

ER diagrams- Entities, Attributes and Entity sets, Relationship sets, Additional features of ER Model, Conceptual Design with ER Model. Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries

UNIT III

Basic SQL Queries - Examples of Basic SQL Queries, Introduction to Sub queries, Correlated Sub queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values, AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema Refinement - Redundancy Issues, Decompositions - Examples related to decompositions, Functional Dependencies

UNIT IV

Normal Forms - FIRST, SECOND, THIRD Normal forms – BCNF, FOURTH Normal Form, FIFTH Normal form. Transaction Concept - Transaction State, ACID Properties, Concurrency control, Serializability and Recoverability. Concurrency Control - Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols.

UNIT V

Data on External Storage - File Organization and Indexing - Clustered Indexes, Primary and Secondary Indexes, Index data Structures - Hash Based Indexing, Tree based Indexing Comparison of File Organizations. Tree Structured Indexing-Indexed Sequential Access Methods(ISAM) , B+ Trees: A Dynamic Index Structure and its operations. Hash Based Indexing - Static Hashing, Extendable hashing, Linear Hashing.

4. Books and Materials

Text Book(s)

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education, 3rd edition, 2017.

Reference Book(s)

1. Database Systems, 6th edition Korth Tata Mc Grawhill 2017.

COURSE STRUCTURE

A30512 – DESIGN AND ANALYSIS OF ALGORITHMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course enables the learner to identify complexity of a given algorithm and techniques. It covers various algorithm design techniques, basic computability concepts and the complexity classes P, NP, NP-Complete are introduced for solving hard problems. The learners of the course can tackle the complex algorithmic problems with great ease in real world situations.

Course Pre/corequisites

1. A30503- Data Structures

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30512.1 Analyze the efficiency of algorithm for a given problem.

A30512.2 Formulate the time order analysis for given algorithm.

A30512.3 Identify the mathematical techniques required to prove the time complexity of an algorithm.

A30512.4 Design appropriate algorithm to solve real world problems.

A30512.5 Develop an application with the designed algorithms.

3. Course Syllabus

UNIT-I

Introduction: Algorithm, specifications of algorithm, algorithm measurement divide and conquer: general method, binary search, finding the maximum and minimum, merge sort, quick sort, selection sort, stressen's matrix multiplication

UNIT-II

Greedy Method & Dynamic Programming: General method, knapsack problem, job scheduling with deadlines, minimum cost spanning trees, optimal storage on tapes, single-source shortest paths. Dynamic programming: General method, multistage graphs, all-pairs shortest paths, 0/1 knapsack, the travelling sales person problem.

UNIT-III

Basic Traversal and Search Techniques & Back tracking: Basic traversal and search techniques: traversal techniques for binary trees, traversal techniques for graphs, connected components and spanning trees, bi-connected components Back tracking: Common method, 8 – queens problem, sum of subsets problem, graph coloring and Hamiltonian cycles.

UNIT-IV

Branch and Bound & Lower Bound Theory: Branch and Bound: The method, travelling salesperson, 0/1 knapsack problem lower bound theory: comparison trees, lower bounds through reductions – multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

UNIT-V

NP – Hard and NP – Complete Problems: NP hardness, NP completeness, consequences of being in P, cook„s theorem, halting problem, non-deterministic problem, clique‟s, SAT problem.

4. Books and Materials

Text Book(s)

1. Ellis Horowitz, S. Satraj Sahani and Rajasekhran, *Fundamentals of Computer Algorithms*, 2nd Edition, University Press.2014.

Reference Book(s)

1. Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson Education, *Design and Analysis of Algorithms*, Pearson Education, 2nd Edition, 2009
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, *Introduction to Algorithms*, 2nd Edition, PHI Pvt. Ltd./ Pearson Education.

COURSE STRUCTURE

A30421 – DIGITAL ELECTRONICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of information representation and number systems, Boolean algebra, logic gates and minimization techniques. The second part of the course deals with combinational and sequential logic, where in the procedures to analyze and design the same will be discussed. This course will be useful to students as a basis for microprocessors and microcontrollers and embedded systems.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30421.1 Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.

A30421.2 Make use of k-map and tabulation methods to minimize Boolean functions and to implement with logic gates.

A30421.3 Analyse basic components used in digital systems such as adder and subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters

A30421.4 Distinguish combinational and sequential logic in terms of their functions.

A30421.5 Design various PLDs such as ROMs, PALs, PLAs and PROMs.

3. Course Syllabus

UNIT-I

DIGITAL SYSTEMS AND BINARY NUMBERS: Review of number systems and their conversions, Representation of negative numbers, binarycodes, and Hamming code. Boolean algebra, Theorems and properties of Boolean algebra, canonical and standard forms of SOP/POS form, digital logic gates, Implementation of universal gates.

UNIT-II

GATE LEVEL MINIMIZATION: The k-map method, four-variable map, five-Variable map, Sum of Products and Product of Sums simplification, don't-care conditions, realization using universal gates, AND-OR-INVERT, OR-AND- INVERT models realization, exclusive-OR properties, The tabulation(QuineMccluskey) method, determination of Prime implicants and essential prime implicants.

UNIT-III

COMBINATIONAL LOGIC: Introduction, analysis and design with basic logic gates (code converters), comparators, data selectors, priority encoders, decoders, full adder, serial binary adder, parallel binary adders-ripple-carry adder, carry-look ahead adder, BCD adder, subtractor and binary multiplier.

UNIT-IV

SEQUENTIAL LOGIC: Memory elements and their excitation functions SR, JK, T, and D latches and flip-flops, master slaveJK flip-flop, analysis and design of clocked sequential circuits, state minimization and assignment. REGISTERS AND COUNTERS: Registers, classification of registers, Bidirectional shift register, design of ripple counters, synchronous counters, ring counter, twisted ring counter.

UNIT-V

MEMORY AND PROGRAMMABLE LOGIC: Types of memories, SRAM, DRAM, ROM, memory decoding, programmable logic array, programmable array logic, and Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices.

4. Books and Materials

Text Book(s)

1) M. Morris Mano, Michael D. Ciletti, *Digital Design*, 4th edition, Pearson Education/PHI,India, 2008
2) Thomas L. Floyd 2006, *Digital fundamentals*, 9th edition, Pearson EducationInternational, 2006

Reference Book(s)

1) Zvi. Kohavi, *Switching and Finite Automata Theory*, Tata McGraw Hill, India, 2004
2) C.V.S. Rao, Switching and Logic Design, 3rd edition, Pearson Education, India, 2009

COURSE STRUCTURE

A30018- NUMERICAL METHODS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: solutions of algebraic & transcendental equations, Interpolation, curve fitting, numerical solutions of differentiation, Integration, first order differential equations, solutions of first order differential equations. The mathematical skills developed through this course form a necessary base to analyze and design problems encountered in their engineering specialization.

Course Pre/corequisites

A2002- Mathematics-I

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30018.1 Apply numerical methods to solve algebraic and transcendental equations.

A30018.2 Derive interpolating polynomials using interpolation formulae.

A30018.3 Apply curve fitting techniques for data representations and computation in engineering analysis

A30018.4 Apply Ordinary Differential Equations to solve Engineering Problems.

A30018.5 Solve differential and integral equations numerically.

3. Course Syllabus

UNIT-I

Solutions of Algebraic and transcendental equations &Interpolation

Introduction-The Bisection method-The Method of False Position-Iteration Method -Newton-Raphson Method. Interpolation, Finite differences, Other difference operators and relations between them, Differences of a polynomial, Missing terms, Newton's interpolation formulae, Interpolation with unequal intervals: Lagrange's interpolation formula.

UNIT-II

Curve fitting : Method of least squares**,** Fitting a straight line, second degree parabola and other curves of the form $y = ae^{bx}$, $y = ab^{x}$, $y = ax^{b}$ by the method of least squares.

UNIT-III

Numerical Differentiation, Integration : Numerical differentiation: Derivatives using Newton's interpolation formulae. Numerical integration: Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule.

UNIT-IV

Ordinary Differential Equations of First Order

Exact, linear and Bernoulli equations, Applications of first order equations : orthogonal trajectories, Newton's law of cooling, Law of natural growth and decay.

UNIT-V

Numerical Solution of Ordinary Differential Equations of First Order

Taylor's series method, Picard's method, Euler's and modified Euler's Method, Runge-Kutta methods, Predictor and Corrector methods: Milne's method, Adams-Bashforth-Moulton method. Numerical solution of Laplace equations using finite difference approximation.

4. Books and Materials

Text Books:

1. B.S. Grewal, *Higher Engineering Mathematics*, 43rd edition, Khanna Publishers, New Delhi, 2014.
2. T.K.V.Iyengar, B.Krishna Gandhi, S.Ranganatham, M.V.S.S.N.Prasad, *Mathematical Methods* ,8th edition, S.Chand& Company Pvt.Ltd, 2013.

Reference Books:

1. B.V. Ramana, *Higher Engineering Mathematics*, 23rd Reprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.
2. S.S.Sastry, *Introductory Methods of Numerical Analysis*, 5th edition, PHI learning private limited, 2012.

COURSE STRUCTURE

A30509– DATABASE MANAGEMENT SYSTEMS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This Laboratory gives hands on experience of designing database and to access it. The learners will be practically able to apply ACID properties, indexing and querying concepts on database for efficient operations. The learners of this course can choose the domain of Data Engineering and can opt their carrier path in database administration or data analytics.

Course Pre/corequisites

A30508 Database Management Systems

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30509.1 Design Database tables for the given problem

A30509.2 Use appropriate querying processing technique to access the data

A30509.3 Apply suitable normal form to eliminate data redundancy

A30509.4 Develop PL/SQL routines for reusability of code

A30509.5 Apply appropriate triggering concepts for automation and performance

3. Course Syllabus

Course Content:

TASK-1	**CREATION OF TABLES:**	

Create a table called **Employee** with the following structure.

Name	Type
Empno	Number
Ename	Varchar2(20)
Job	Varchar2(20)
Doj	Number
Sal	Number

a. Add a column commission with domain to the Employee table.
b. Insert any five records into the table.
c. Update the column details of job

d. Rename the column of Employ table using alter command.
e. Delete the employee whose empno is19

TASK-2

Create **department** table with the followingstructure.

Name	Type
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

a. Add column designation to the department table.
b. Insert values into the table.
c. List the records of emp table grouped by deptno.
d. Update the record where deptno is9.
e. Delete any column data from the table.

TASK-3

Create a table called **Customer**table

Name	Type
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

a. Insert records into the table.
b. Add salary column to the table.
c. Alter the table column domain.
d. Drop salary column of the customer table.
e. Delete the rows of customer table whose cust_city is‘kurnool’.

TASK-4

Create a table called **branch** table.

Name	Type
Branchname	Varchar2(20)
Branchcity	Varchar2(20) asserts
Branchname	Varchar2(20)

a. Increase the size of data type for asserts to the branch.
b. Add and drop a column to the branch table.
c. Insert values to the table.
d. Update the branch name column
e. Delete any two columns from the table

TASK-5

Create a table called **sailor** table

Name	Type
Sid Number	Sname Varchar2(20)
Rating Varchar2(20)	Varchar2(20)
Sid Number	Sname Varchar2(20)

a. Add column age to the sailor table.
b. Insert values into the sailor table.
c. Delete the row with rating >8.
d. Update the column details of sailor.
e. Insert null values into the table.

TASK-6

Create a table called **reserves**table

Name	Type
Boat id	Integer
Sid	Integer
Day	Integer

a. Insert values into the reserves table.
b. Add column time to the reserves table.
c. Alter the column day data type to date.
d. Drop the column time in the table.
e. Delete the row of the table with some condition.

TASK-7 **QUERIES USING DDL AND DML**

A college consists of number of employees working in different departments. In this context, create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:

- Create tables department and employee with required constraints.
- Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
- Basic column should not be null
- Add constraint that basic should not be less than 5000.
- Calculate hra,da,gross and net by using PL/SQL program.
- Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.

- The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.The percentage of hra and da are to be stored separately.
- When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
- Empno should be unique and has to be generated automatically.
- If the employee is going to retire in a particular month, automatically a message has to be generated.
- The default value for date-of-birth is 1 jan, 1970.
- When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
- Display the information of the employees and departments with description of the fields.
- Display the average salary of all the departments.
- Display the average salary department wise.
- Display the maximum salary of each department and also all departments put together.
- Commit the changes whenever required and rollback if necessary.
- Use substitution variables to insert values repeatedly.
- Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.
- Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
- Find the employees whose name contains ‘en’.
- Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
- Create alias for columns and use them in queries.
- List the employees according to ascending order of salary.
- List the employees according to ascending order of salary in each department.
- Use ‘&&’ wherever necessary
- Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
- The retirement age is 60 years. Display the retirement day of all the employees.
- If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
- Find the employees who are born in leap year.
- Find the employees who are born on feb 29.
- Find the departments where the salary of atleast one employee is more than 20000.
- Find the departments where the salary of all the employees is less than 20000.
- On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.

TASK-8	**CURSORS**	

1. Write a PL/SQL block that will display the name, dept no, salary of fist highest paid employees.
2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction, in case the item id is not present in the item master table then the record is inserted in the item master table.
3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to find employee with given job and deptno.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salaryare updated we get a message 'None of the salaries were updated'. Else we get a message

TASK-9	PROCEDURES AND FUNCTIONS	

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.
3. Create a function to find the factorial of a given number
4. Create function to the reverse of given number.

TASK-10	TRIGGERS	

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values: CUSTOMERS table:

Id	**Name**	**Age**	**Address**	**Salary**
1	Sri Lakshmi	34	Kurnool	50000
2	Sreedhar	36	Hyderabad	80000
3	Neetu	30	Chennai	30000
4	Nymisha	29	Delhi	20000
5	Nishitha	25	Bombay	40000
6	Jyothsna	29	kurnool	60000

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database. Passenger(Passport_ id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL, Age); Integer Not NULL, Sex Char, Address VARCHAR (50) Not NULL

a. Write a Insert Trigger to check the Passport_id is exactly six digits or not.
b. Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is updated' when insertion, deletion and updation are done on passenger respectively.

3. Insert row in employee table using Triggers. If any employee has same name it must be replaced by new name. These triggers can be raised before insert, update or delete rows on data base.
4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.

A Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete _emp and also record user who has deleted the record and date and time of delete.

TASK-11	CASE STUDY GENERAL HOSPITAL	

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do thefollowing.

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams.
Create tables and generate Queries

TASK-12	CASE STUDY: CAR RENTAL COMPANY	

A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephonenumber, Drivinglicense,numberabouteachcustomerarekeptinthedatabase.Fortheabovecase.

study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams.
Create tables and generate Queries

TASK-13	CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM	

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre- requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Create tables and generate Queries

4. Laboratory Equipment/Software/Tools Required

SQL

5. Books and Materials

Text Books

1. *Data base Management Systems*, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education, 3rd Edition, 2003.

COURSE STRUCTURE

A30422 –DIGITAL ELECTRONIC LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course DescriptionCourse

Overview

This laboratory course provides the students to study representation of switching functions using Boolean expressions and their minimization techniques, the combinational logic design of various logic and switching devices and their realization, the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices.

Course Pre/corequisites

1. A30421 – Digital Electronics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30422.1	Design digital logic circuits using software.
A30422.2	Verify the logical operations of the digital logic gates in the laboratory.
A30422.3	Analyze the functionality of Combinational and Sequential Circuits using LogiSIM.
A30422.4	Design and analyze the code converters using LogiSIM.
A30422.5	Design and analyze the counters using LogiSIM.

3. Course Syllabus

1. Realization of logic gates
2. Realization of Boolean function using basic gates
3. Realization of Boolean function using Universal gates
4. Implementation and verification of Code Converters
5. Implementation and verification of Half adder and Full adder
6. Implementation and verification of Half subtractor and Full subtractor
7. Implementation and verification of multiplexers
8. Implementation and verification of magnitude comparators
9. Design and verification of Flip-flops
10. Design and implementation of synchronous and ripple counters

4. Laboratory Equipment/Software/Tools Required:

1. Computers installed with operating system
2. Logisim simulation software tool

5. Books and Materials

Text Book(s)

1. M. Morris Mano, Michael D. Ciletti, *Digital Design*, 4th edition, Pearson Education/PHI,India, 2008
2. Thomas L. Floyd 2006, *Digital fundamentals*, 9th edition, Pearson EducationInternational, 2006

Reference Book(s)

1. Zvi. Kohavi*, Switching and Finite Automata Theory*, Tata McGraw Hill, India, 2004
2. C.V.S. Rao, Switching and Logic Design, 3rd edition, Pearson Education, India, 2009

COURSE STRUCTURE

A30516 – DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This Laboratory drives the learners to experience the complexity of a given algorithm and give programmatic solutions. It gives hands on practice in implementing various algorithmic design techniques, in solving problems. This helps the learners to solve the complex problems in any domain demanding algorithmic solutions.

Course Pre/Corequisites

1. A30504-Data Structures Laboratory
2. A30510-Object oriented programming through java laboratory

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30516.1	Apply basic programming techniques in solving given problem.
A30516.2	Design an algorithm for a given application program.
A30516.3	Utilize wrapper classes as per the demand of problem.
A30516.4	Apply the appropriate algorithmic technique for efficient problem solving.
A30516.5	Execute collection classes for dynamic programming.

3. Course Syllabus

List of Experiments

1. Create a Java class called Student with the following details as variables within it. (i) USN (ii) Name (iii) Branch (iv) Phone Write a Java program to create n Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.
2. Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.
3. Write a Java class called Customer to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as"/".
4. Sort a given set of elements using the best sorting method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be

generated using the random number generator. Demonstrate using Java which technique is good to calculate time complexity analysis: worst case, average case and best case.

5. Write a java program to implement the following sorting techniques by using Divide and Conquer Method: a) Insertion Sort b) Selection sort
6. Write a java program for an array of jobs where every job has a deadline and associated profit if the job is finished before the deadline. It is also given that every job takes single unit of time, so the minimum possible deadline for any job is 1. How to maximize total profit if only one job can be scheduled at a time.
7. Write java code to check whether a given graph is strongly connected or not.
   Given an integer array nums, find the contiguous subarray (containing at least one number) which has the largest sum and return its sum.(Using Dynamic Programming) Example: Input: [-2,1,-3,4,-1,2,1,-5,4], Output: 6 Explanation: [4,-1,2,1] has the largest sum = 6.
8. Write a java for the given an undirected weighted connected graph consisting of n vertices and m edges. The task is to find any spanning tree of this graph such that the maximum degree over all vertices is maximum possible. The order in which you print the output edges does not matter and an edge can be printed in reverse also i.e. (u, v) can also be printed as (v, u).
9. Write a Java Program is to Implement Knight‟s Tour Problem.A knight‟s tour is a sequence of moves of a knight on a chessboard such that the knight visits every square exactly once. If the knight ends on a square that is one knight‟s move from the beginning square (so that it could tour the board again immediately, following the same path), the tour is closed, and otherwise it is open. The exact number of open tours on an 8×8 chessboard is still unknown.

10.a. Design and implement in Java to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d.

b. Write a program to print all permutations of a given string using Backtracking.

4. Laboratory Equipment/Software/Tools Required

1. Open source Java Tool kit: JDK 8 and above versions
2. A diagramming tool: A diagramming tool lets you draw pictures of your network. Visio (from Microsoft).
3. A network discovery program: For larger networks, you may want to invest in a network discovery program such as Spice works.
4. A protocol analyzer: A *protocol analyzer* monitors and logs the individual packets that travel along your network. (Protocol analyzers are also called *packet sniffers.*) , Network Monitor tool.

5. Books and Materials

Text Book(s)

1. Ellis Horowitz, S. SatrajSahani and Rajasekhran, *Fundamentals of Computer Algorithms*,2nd Edition, University Press.2014.

Reference Book(s)

1. ParagHimanshu Dave, HimanshuBhalchandra Dave, *Design and Analysis of Algorithms*, Pearson Education, 2nd Edition, 2009.
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, *Introduction to Algorithms*, PHI Pvt. Ltd./ Pearson Education
3. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, *Introduction to Design and Analysis of Algorithms A strategic approach*, McGraw Hill.

COURSE STRUCTURE

A30511– ANDROID APPLICATION DEVELOPMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	14	0	28	2	40	60	100

1. Course Description

Course Overview

The main aim of this course is to learn about Android based mobile devices types and modern mobile Android operating systems. The students learn about systems for mobile application distribution and mobile design principles. This course utilizes rapid prototyping techniques to design and develop sophisticated mobile interfaces.

Course Pre/corequisites

This course has no pre/co-requisites.

2. Course Outcomes (COs)

After the completion of the course, the learner will be able to:

A30511.1 Understand the different types of mobile devices.

A30511.2 Learn how to apply Android Operating System on mobile.

A30511.3 They can understand the systems mobile application distribution.

A30511.4 Implementation of mobile design principles.

A30511.5 Implementation of prompt prototyping techniques to design and develop mobile interfaces

3. Course Syllabus

List of Experiments:

1. **INTRODUCTION:** Introduction to Mobile Computing and Android Development Environment.
2. **FACTORS IN DEVELOPING MOBILE APPLICATIONS: Introduction to** Mobile Software Engineering, Frameworks and tools, Introduction to Generic UI Development.
3. **APPLICATINS UIS:** Introduction to UIS and Mobile Applications, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal UIS
4. **INTENTS AND SERVICES:** Introduction to Android Intents and Services, Characteristics of Mobile Applications and Successful Mobile Development.
5. **STORING AND RETRIEVING DATA:** Synchronization and Replication of Mobile Data , Getting the Model Right Android Storing and Retrieving Data , Working with a Content Provider

4. Laboratory Equipment/Software/Tools Required

1. Amazon Web Services (AWS)
2. Microsoft Azure

5.Books and Materials

1. Beginning Android programming with android studio 4th edition, J. F. DiMarzio, Published by John Wiley & Sons, Inc.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30035-UNIVERSAL HUMAN VALUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	3	100*	---	100*

1. Course Description

Course Overview:

This course is aimed at giving inputs that will help to ensure the right understanding and right feelings in the students in their life and profession, enabling them to lead an ethical life. In this course, the students learn the process of self-exploration, the difference between the Self and the Body, the naturally acceptable feelings in relationships in a family, the comprehensive human goal in the society, the mutual fulfillment in the nature and the co-existence in existence. As a natural outcome of such inputs, they are able to evaluate an ethical life and profession ahead.

Course Pre/Co-requisites:

The course has no specific pre/co-requisites

Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30035.1 Understand the significance of value inputs in a classroom and start applying them in their life and profession

A30035.2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

A30035.3 Understand the value of harmonious relationship based on trust and respect in their life and profession

A30035.4 Understand the role of a human being in ensuring harmony in society and nature.

A30035.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

A30035.6 Analyze the value of maintaining ethical values in critical situations

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

Course Syllabus

UNIT – I

Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance'and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT –II

Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and
enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I',
Understanding the harmony of I with the Body: Sanyam and Swasthya; correctappraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya

UNIT –III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship, Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

UNIT –IV

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics:

a) Ability to utilize the professional competence for augmenting universal human order,b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models

Case studies of typical holistic technologies, management models and production, systems, Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations

4. Books and Materials

Text Book:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Books:

1. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
2. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
3. A N Tripathy, 2003, Human Values, New Age International Publishers.
4. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
5. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

R20-COURSE STRUCTURE

IV – SEMESTER

COURSE STRUCTURE

A33106 DATA SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The main objective of the course is to identify the characteristics of datasets and emerging technologies in data science. This course also Understand the Basics of Big Data, Machine learning, deep learning and data visualization.

Course Pre/corequisites

A33101-Fundamentals of AI

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A33106.1 Understand the fundamental concepts of data science

A33106.2 Evaluate the data analysis techniques for applications handling large data

A33106.3 Demonstrate the various machine learning algorithms used in data science process

A33106.4 Understand the ethical practices of data science

A33106.5 Visualize and present the inference using various tools

3. Course Syllabus

UNIT-I

INTRODUCTION TO DATA SCIENCE: Definition – Big Data and Data Science Hype – Why data science – Getting Past the Hype – The Current Landscape – Data Scientist –stages of analytics- Data Science Process Overview –Defining goals – Retrieving data – Data preparation – Data exploration – Data modeling –Presentation.

UNIT-II

BIG DATA : Problems when handling large data – General techniques for handling large data – Case study– Steps in big data – Distributing data storage and processing with Frameworks – Case study.

UNIT-III

MACHINE LEARNING: Machine learning – Modeling Process – Training model – Validating model – Predicting new observations –Supervised learning algorithms – Unsupervised learning algorithms.

UNIT-IV

DEEP LEARNING: Introduction – Deep Feedforward Networks – Regularization – Optimization of Deep Learning– Convolutional Networks – Recurrent and Recursive Nets – Applications of Deep Learning.

UNIT-V

DATA VISUALIZATION: Introduction to data visualization –various graphical techniques to understand data, Data visualization options – Filters – Map Reduce – Dashboard development tools – Creating an interactive dashboard with dc.js-summary.

4. Books and Materials

Text Books

1. Introducing Data Science- Davy Cielen- Arno D. B. Meysman- Mohamed Ali- Manning Publications Co.- 1st edition- 2016

2. An Introduction to Statistical Learning: with Applications in R- Gareth James- Daniela Witten- Trevor Hastie- Robert Tibshirani- Springer- 1st edition- 2013

3. Deep Learning- Ian Goodfellow- YoshuaBengio- Aaron Courville- MIT Press- 1st edition-2016

Reference Book(s)

1. Data Science from Scratch: First Principles with Python- Joel Grus- O'Reilly- 1st edition-2015

2. Doing Data Science- Straight Talk from the Frontline- Cathy O'Neil- Rachel Schutt- O' Reilly-1st edition- 2013

COURSE STRUCTURE

A30507 –OBJECT ORIENTED PROGRAMMING USING JAVA

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a comprehensive coverage of Object Oriented Programming concepts using Java. It covers abstract data types, Strings, arrays. It also covers interfaces, inheritance, packages, exception handling, multithreading, files and swings. This course helps the students to choose their career as software engineers.

Course pre/corequisites

A30501-Python Programming

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30507.1	Apply object oriented concepts for solving general purpose problems
A30507.2	Use inheritance, user defined packages and interfaces for code reusability
A30507.3	Apply exception handling and multithreading for robust and efficient application development
A30507.4	Implement collection frameworks to store and retrieve data efficiently
A30507.5	Build GUI applications using swings for user interface design

3. Course Syllabus

UNIT I

The History and Evolution of Java- History of java, java's magic: the byte code, java buzzwords, evolution of java, object oriented programming. Data Types, Arrays, Variables and Operators- Primitive types, literals, variables, type conversion and casting, arrays, string class, pointers, operators.

UNIT II

Control Statements- Selection statements, iteration statements, jump statements. Introducing classes- Class fundamentals, objects, methods, constructors, this keyword, garbage collection, overloading, argument passing, recursion, static, command line and variable length arguments.

UNIT III

Inheritance- Basics, using super, multi-level hierarchy, method overriding, dynamic method dispatch, abstract class, final with inheritance. Packages and Interfaces- Packages, access protection, interfaces, default interfaces, default interface methods, static methods in an interface. Exception Handling- Fundamentals, exception types, nested try statements, throw, throws, finally, built-in and user defined exceptions, chained exceptions.

UNIT IV

Multithreaded Programming: Thread model, main thread, creating thread, isalive() and join(), thread priorities, synchronization, inter thread communication, suspending, resuming and stopping threads, obtaining a thread state. Input and Output Operations: I/O basics, reading console input, writing console output, the Print Writer class, reading and writing files, automatically closing a file.

UNIT V

Collections Framework: Collection classes- Array List, Linked List, Hash Set, Tree Set, Using an Iterator and Spliterators. Swings: The origins of swing, two key swing features, components and containers, the swing packages, a simple swing application, event handling, create a swing applet, exploring swing.

4. Books and Materials

Text Book(s)

1. Herbert Schildt, *Java The Complete Reference*, MC Graw Hill Education, 9th edition, 2016.

Reference Book(s)

1. T. V. Suresh Kumar, B.Eswara Reddy, P.Raghavan, *Programming with Java,* Pearson, 2011.
2. Paul Deitel, Harvey Deitel, *Java – How to Program,* Pearson, 2nd edition, 2012.
3. Kathy Sierra, Bert Bates, *Head First Java,* O'Reilly, 2nd edition, 2005.

COURSE STRUCTURE

A30016- DISCRETE MATHEMATICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course will simplify and evaluate basic logic statements. It solves problems using operations on sets, functions, recurrence relations to analyze algorithms, algebraic structure, counting, graph theory and traversal techniques. The learner will be able to develop mathematical models for computing problems.

Course Pre/co requisites

A30002 Mathematics -1

2. Course Outcomes (COs)

After completion of the course, learner will be able to:

A30016.1 Apply the logic statements and connectives to solve real time problems

A30016.2 Classify algebraic structure and relations for a given mathematical problem

A30016.3 Analyze the basic results in combinatorics and binomial thermos for accuracy

A30016.4 Apply various recurrence relations to find solutions for numeric sequences

A30016.5 Apply graph theory techniques to solve network problems

3. Course Syllabus

UNIT-I

Mathematical Logic : Statements and Notation, Well Formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Validity using Truth Tables, Rules of Inference, Consistency of Premises and Indirect Method of Proof, Automatic Theorem Proving, Predicates, The Statement Function, Variables and Quantifiers, Predicate Formulas

UNIT-II

Relations And Functions: Properties of binary Relations in a Set, Relation Matrix and the Graph of a Relation, Partition and Covering of a Set, Equivalence Relations, Compatibility Relations, Partial Ordering, Hasse Diagram. Functions, Composition of Functions.

UNIT-III

Algebraic Structures: Algebraic Systems, Simple Algebraic Systems and General Properties, Semi Groups and Monoids, Groups, Subgroups, Homomorphism, Isomorphism. Elementary Combinatorics: Basics of Counting, Combinations and permutations, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion-Exclusion, Pigeonhole Principle and its Applications.

UNIT-IV

Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The Method of Characteristic Roots, Solutions of Inhomogeneous Recurrence Relations.

Unit-V

Graph Theory: Basic Concepts, Representation of Graphs, Isomorphism and Sub graphs, Spanning Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

4. Books and Materials

Text Book(s)

1. J.P.Tremblay, R.Manohar*, Discrete Mathematical Structures with Applications to Computer Science*. TMH, 2015.
2. Joe L. Mott. Abraham Kandel and Theodore P. Baker, *Discrete Mathematics for Computer Scientists & Mathematicians,* 2nd Edition, Pearson, 2015.

Reference Book(s)

1. N. Chandrasekaran, M. Umaparvathi, *Discrete Mathematics*, PHI Learning Pvt. Ltd, 2012.
2. BernandKolman, Roberty C. Busby, Sharn Cutter Ross, *Discrete Mathematical Structures*. Pearson Education, 2014.

COURSE STRUCTURE
A30514 – OPERATING SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course makes the students understand the basic concepts of various operating systems. It covers processes, threads, scheduling, synchronization, deadlocks, memory management, file & I/O subsystems and protection concepts. The learners of this course can choose their career as system programmers.

Course Pre/corequisites

A30501- Computer Programming

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30514.1 Apply the basic principles of Operating Systems in system programming

A30514.2 Apply the process synchronization concepts in multiprogramming environment

A30514.3 Solve the memory management problems with paging and segmentation techniques

A30514.4 Design algorithmic strategies to handle deadlock problems

A30514.5 Implement the concepts of secured file system for confidentiality and authentication.

3. Course Syllabus

UNIT-I

Operating system functions, structure, Operations, protection and security, Computing Environments, Open- Source OS. System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

UNIT-II

Processes: Process concept, Scheduling, Operations, Inter process Communication. Process Synchronization: The critical-section problem, Peterson‘s Solution, Synchronization Hardware, Synchronization algorithms.

UNIT-III

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation. Swapping, contiguous memory allocation, segmentation, paging, structure of the page table. Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

UNIT-IV

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock. Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

UNIT-V

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management. Protection**:** Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights.

4. Books and Materials

Text Book(s)

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, Wiley, 8th Edition, 2014.

Reference Book(s)

1. Andrew S Tanenbaum, *Modern Operating Systems*, Second Edition, PHI.
2. G.Nutt, N.Chaki and S.Neogy, *Operating Systems*, Third Edition, Pearson Education

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COURSE STRUCTURE

A30515 – SOFTWARE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with engineering principles and programming languages applied in software development. The course will orient the students to the different software process models, software requirements engineering process, systems analysis and design as a problem-solving activity, with focus on quality. The knowledge acquired through this course is used to handle projects efficiently with minimizing cost and complexity.

Course Pre/corequisites

A30501-Python Programming

2. Course Outcomes (COs)

After the completion of the course, the learner will be able to:

A30515.1 Understand the various phases of software development life cycles and software Requirements.

A30515.2 Possess necessary skills to elicit the requirements of a software system and to create well written software documentation involving appropriate system models.

A30515.3 Design, implement and evaluate a computer based system, process, component or program to meet desired needs within realistic constraints specific to the field

A30515.4 Construct software projects by integrating components with appropriate user interface

A30515.5 Apply various testing strategies to verify, validate and to release error free software

3. Course Syllabus

UNIT I

Software and Software Engineering: The Characteristics of Software, the Distinctive Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. Process Models: A General Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process. Agile Development: Agility, Agility and the Cost of Change, Agile Process, Extreme Programming, Other Agile Process Models.

UNIT II

Requirements Engineering: Understanding Requirements: Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the requirements model, Negotiating Requirements, Validating Requirements. Requirements Modeling (Scenarios, Information and Analysis Classes): Requirements Analysis, Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling. Requirements Modeling (Flow, Behavior, Patterns and WEBAPPS): Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Requirements Patterns Modeling,

UNIT III

Design Concepts: Design with Context of Software Engineering, The Design Process, Design Concepts, The Design Model. Architectural Design: Software Architecture, Architecture Genres, Architecture Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow.

UNIT IV

User Interface Design: The Golden Rules, UI Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation. WebApp Design: WebApp Design Quality, Design Goal, A Design Pyramid for WebApps, WebApp Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component-Level Design, Object-Oriented Hypermedia Design Method.

UNIT V

Software Testing Strategies: A Planned Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, Validation Testing, System Testing, The Art of Debugging. Testing Conventional Applications: Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, basic Path testing, Control Structure Testing, Black-Box Testing, Model-based Testing. Testing Object-Oriented Applications: Broadening the View of Testing, Testing with OOA and OOD Models, Object-Oriented Testing Strategies, Object-Oriented Testing Methods.

4. Books and Materials

Text Book(s)

1. Roger S. Pressman *Software engineering A practitioners Approach*, McGraw Hill International Education, Seventh Edition, 2016.

Reference Book(s)

1. IAN Sommerville, *Software Engineering*, Ninth Edition. *Pearson, Ninth edition*
2. Rajib Mall , *Fundamentals of Software Engineering*, Fourth Edition, , PHI.
3. Pankaj Jalote ,*Software Engineering, A Precise Approach*, , Wiley India,2010.

COURSE STRUCTURE

A33107– DATA SCIENCE LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

The main objective of this Laboratory is to Learn the basics of data science concepts in practice. This course offers the modern programming language R that shall help the students to implement the various concepts practically so that the students will be able to program in the R studio with the usage of R programming

Course Pre/corequisites

A30513– DATA SCIENCE

2. Course Outcomes (COs)

After the completion of the course, the learner will be able to:

A33107.1 Apply Abstraction to create models based on the real world.

A33107.2 Understand several techniques from previously established paradigms, including modularity, encapsulation and Polymorphism.

A33107.3 Apply greater flexibility and maintainability in programming.

A33107.4 Improve the knowledge on Objects and class.

3. Course Syllabus

1. Introduction to R and simple Programs on data types
2. Simple Programs on R Objects
3. Programs on control statements Using R
4. Simple Programs using functions Using R
5. Programs on R reading and writing data from files
6. Programs using loop functions
7. Programs to implement charts (Bar Chart & Histogram in R with Example)
8. Import Data into R: Read CSV, Excel
9. Programs to implement Correlation in R: Pearson & Spearman with Matrix Example
10. Programs on R Aggregate Function: Summarise & Group_by () Example
11. Program to Scatter Plot in R using ggplot2 (with Example)

3. Laboratory Equipment/Software/Tools Required

SOFTWARE: Dev C++, Turbo C++

4. Books and Materials

1. 1. Barkakatin, objects-oriented programming in C++, PHI, 1995.
2. 2. Lafore, Object Oriented Programming in C++, Fourth Edition, Pearson Education.

COURSE STRUCTURE

A30510–OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course provides hands on experience in applying object oriented concepts using Java. The learner will be able to practically handle problems related to arrays, Strings, interfaces, inheritance, packages, exception handling, multithreading, files and swings and give effective solution programmatically. This helps the students to choose their career as software engineers.

Course Pre/corequisites

1. A30501-Python Programming
2. A30507- Object Oriented Programming Using Java

2. Course Outcomes (COs)

After the completion of the course, the learner will be able to:

A30510.1	Design solutions for the problems of general purpose applications using object oriented concepts.
A30510.2	Generate reusable codes using inheritance, user defined packages and interface
A30510.3	Write robust and efficient code using exception handling and multithreading concepts
A30510.4	Implement collection frameworks and file handling techniques to store and retrieve data
A30510.5	Design user interface using swings

3. Course Syllabus

Lab Experiments:

1. Installation of Java software and study of any integrated development environment. Learn to compile, debug and execute java programs.
2. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read, display it only if it is not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.
3. Write a java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub classes override area() so that it returns the area of a rectangle and triangle respectively.
4. Develop a java application for Banking transactions by using inheritance concept.
5. Create an interface for stack with push and pop operations. Implement the stack in two ways: fixed size stack and Dynamic stack
6. Write Java program(s) which uses the exception handling features of the language, creates exceptions and handles them properly, uses the predefined exceptions, and create own exceptions.

7. Write a Java program that creates three threads. First thread displays “Good Morning ”every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
8. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
9. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
10. Write a java program to find and replace pattern in a given file.
11. Implement collection frameworks to retrieve data.
12. Write a java program to handle mouse events.
13. Write a java program to handle keyboard events.
14. Develop a swing program for waving a Flag using applets and threads.
15. U sing swings design a simple calculator which performs all arithmetic operations.
16. Write a java program that allows conduction of object type examination containing multiple choice questions, and true/false questions. At the end of the examination when the user clicks a button the total marks have to be displayed in the form of the message.

4. Laboratory Equipment/Software/Tools Required

1. Open source Java Tool kit: JDK 8 and above versions

5. Books and Materials

Text Book(s)

1. Herbert Schildt. *Java The Complete Reference*. MC GRAW HILL Education, 9th Edition, 2016.

Reference Book(s)

1. T. V. Suresh Kumar, B.Eswara Reddy and P.Raghavan. *Programming with Java.* Pearson, 2011.
2. Paul Deitel and Harvey Deitel. *Java – How to Program.* Pearson, 2nd Edition, 2012.
3. Kathy Sierra and Bert Bates. *Head First Java.* O’Reilly, 2nd Edition, 2005.

COURSE STRUCTURE

A30518– OPERATING SYSTEMS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course makes the students practice the basic concepts of various operating systems. It gives hands on experience with lab programs covering the topics of processes, threads, scheduling, synchronization, deadlocks, memory management, file & I/O subsystems. The learners of this course can choose their career as system programmers.

Course Pre/corequisites

A30514: Operating Systems

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30518.1 Apply appropriate CPU scheduling algorithm for the given problem.

A30518.2 Perform resource management for optimal utility of CPU.

A30518.3 Implement algorithms handling deadlock problems

A30518.4 Implement the concepts of secured file system for confidentiality and authentication.

A30518.5 Apply threading concepts to handle concurrency.

3. Course Syllabus

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
   a) FIFO b) LRU c) LFU Etc. …
8. Simulate Paging Technique of memory management
9. Control the number of ports opened by the operating system with
   a) Semaphore b) monitors
10. Simulate how parent and child processes use shared memory and address space

11. Simulate sleeping barber problem
12. Simulate dining philosopher's problem
13. Simulate producer and consumer problem using threads (use java)
14. Simulate little's formula to predict next burst time of a process for SJF scheduling algorithm.
15. Develop a code to detect a cycle in wait-for graph
16. Develop a code to convert virtual address to physical address
17. Simulate how operating system allocates frame to process
18. Simulate the prediction of deadlock in operating system when all the processes announce their resource requirement in advance.

4 Laboratory Equipment/Software/Tools Required:

1. Computers installed with operating system
2. C Compiler

5 Books and Materials

Text Book(s)

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, Wiley, 8th Edition, 2014.

Reference Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth edition, John Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition–2009, Pearson Education
3. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
4. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
5. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.2013-2014
6. Operating Systems, A.S.Godbole, Second Edition, TMH.
7. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.

COURSE STRUCTURE
A33108– UNIX & SHELL PROGRAMMING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	14	0	28	2	40	60	100

1. Course Description

Course Overview

The main objective of this course is to familiarize with the Unix/Linux command line and running simple commands and concept of environment variables and with the simple use of environment variables.

Course Pre/Co-requisites

No Pre-requisities

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A33108.1 Understand the basic unix/linux commands

A33108.2 Learn importance of shell scripting

A33108.3 Apply shell programming to various files

A33108.4 Improve individual / teamwork skills, communication & report writing skills with ethical values

3. Course Syllabus

Basic Linux Commands : Study of Unix/Linux general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands, study of vi editor, study of Unix/Linux file system

Introduction to Shell : Introduction to Shell, Shell responsibilities, running a shell script. Variables, passing arguments, Basic Operators, Basic String Operations, Decision Making, Loops, Arrays, Arrays – Comparison, Shell functions.

Advanced Shell : Special Variables, Bash trap command, File Testing, Input Parameter Parsing, Pipelines, Process Substitution, Regular Expressions, Special Commands: sed, awk, grep, sort.

Example Programs:

1. Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc,

   sort, cut,grep,dd, dfspace, du, ulimit
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script exercises based on following:

   (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then-

else-fi, nested if-else (v) Logical operators (vi) else + if equals elif, case structure (vii) while, until, for loops, use of break

4. Write a shell script to create a file. Follow the instructions
   (i) Input a page profile to yourself, copy it into other existing file
   (ii) Start printing file at certain line
   (iii) Print all the difference between two file, copy the two files.
   (iv) Print lines matching certain word pattern.
5. Write shell script for-
   (i) Showing the count of users logged in,
   (ii) Printing Column list of files in your home directory
   (iii) Listing your job with below normal priority
   (iv) Continue running your job after logging out
6. Write a shell script to change data format. Show the time taken in execution of this script.
7. Write a shell script to print files names in a directory showing date of creation & serialnumberof the file.
8. Write a shell script to count lines, words, and characters in its input (do not use wc).

4. Books and Materials

Text Book(s)

1. Learning the bash Shell, 3rd Edition by Cameron Newham, Publisher(s): O'Reilly Media, Inc., ISBN: 9780596009656.

Reference Book(s)

1. UNIX and Shell Programming by Behrouz A. Forouzan, Richard F. Gilberg Publisher: Thomson Press (India) Ltd, ISBN: 9788131503256, 9788131503256.
2. Shell Scripting: Expert Recipes for Linux, Bash, and More by Steve Parker

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH. – COMPUTER SCIENCE AND ENGINEERING - ARTIFICIAL INTELLIGENCE(CAI)

V SEMESTER (III YEAR)

Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A33109	Advanced Artificial Intelligence	PC	3	0	0	3	40	60	100
A33110	Theory of Computation and Compiler Design	PC	3	0	0	3	40	60	100
A33111	Machine Learning	PC	3	0	0	3	40	60	100
	Professional Elective-I	PE	3	0	0	3	40	60	100
	Open Elective-I	OE	3	0	0	3	40	60	100
A33112	Advanced Artificial Intelligence Lab	PC	0	0	3	1.5	40	60	100
A33113	Machine Learning Lab	PC	0	0	3	1.5	40	60	100
A33114	Web Application Development	SC	1	0	2	2	40	60	100
A30034	Gender Sensitization	MC	2	0	0	0	100*	0	100*
A33115	Summer Internship 2 Months (Mandatory)		0	0	0	1.5	100	0	100
	TOTAL		18	00	08	21.5	520	480	900

* The marks for Mandatory Courses are not considered for calculating SGPA

VI SEMESTER (III YEAR)

Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A33116	Deep Learning	PC	3	0	0	3	40	60	100
A33117	Cryptography and Network Security	PC	3	0	0	3	40	60	100
A33118	Natural Language Processing	PC	3	0	0	3	40	60	100
	Professional Elective-II	PE	3	0	0	3	40	60	100
	Open Elective-II	OE	3	0	0	3	40	60	100
A33119	Deep Learning Lab	PC	0	0	3	1.5	40	60	100
A33122	Cryptography and network security Lab	PC	0	0	3	1.5	40	60	100
A33121	Natural Language Processing Lab	PC	0	0	3	1.5	40	60	100
A30021	Professional English and Communication Skills	SC	1	0	2	2	40	60	100
A30036	Indian Constitution and Multiculturalism	MC	2	0	0	0	100*	00	100*
TOTAL			18	00	11	21.5	360	540	900

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH. – COMPUTER SCIENCE ANDENGINEERING - ARTIFICIAL INTELLIGENCE (CAI)

Professional Electives

Professional Elective – 1	
Course Code	
A33124	Big Data Technologies
A33125	Data Communication
A33126	Data Visualization Technique2s
A33127	Image Processing
A33151	Advanced R Programming for Data Analytics in Business
Professional Elective – 2	
Course Code	**Title of the Course**
A33128	Computer Vision
A33129	Software Testing Methodologies
A33130	Virtual Reality and Augmented Reality
A33131	Predictive Analytics

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(AUTONOMOUS)

COURSE STRUCTURE

V - Semester

COURSE STRUCTURE
A33109 – Advanced Artificial Intelligence

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Overview:

To understand some fundamentals of AI and algorithms required to produce AI systems. The fundamental concepts of Propagation fading techniques and its types.

Pre-requisite: Mathematics and Programming

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33109 .1 Evaluate Artificial Intelligence (AI) methods and describe their foundations.
A33109 .2 Apply basic principles of AI in solutions that require problem solving, inference, perception.
A33109 .3 Analyze and illustrate how search algorithms play vital role in problem-solving
A33109 .4 Demonstrate knowledge of Agents and learning in online search.
A33109 .5 Illustrate the construction of learning and expert system.

3.Course Syllabus

UNIT – I **Introduction**

Introduction – Foundations of AI, the History of AI –Intelligent Agent–Agent and Environment, Good Behaviour: The Concept of Rationality, Nature of Environments, Structure of Agents- Problem Solving Agents -Example Problems.

UNIT – II **Solving Problems by searching**

Uninformed Searching strategies-Breadth First Search, Depth First search, Depth limited search, Iterative deepening search, Bidirectional Search - Avoiding repeated States - Searching with Partial information –Informed search strategies – Greedy Best First Search-A* Search-Heuristic Functions-Local Search Algorithms for Optimization Problems-Local search in Continuous Spaces.

UNIT – III **Online Search Agents and Unknown Environments**

Online Search Problems, Online Search Agents- Online Local search, learning in Online Search–ConstraintSatisfactionProblems-Backtracking CSP.

UNIT – IV **Logical agents**

Knowledge Based Agents, The Wumpus World, Propositional Logic-A very simple Logic -First Order logic– inferences in first order logic – forward chaining – backward chaining –Unification – Resolution.

UNIT – V **Planning with state space search**

Planning with state space search – Partial-order planning – Planning graphs – Planning and acting in the real world.

4.Textbooks:

1. Stuart J. Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.
2. Elain Rich Kevin knight Shivashankar "Artificial Intelligence" 3rd Edition, Mcgraw

Reference Books:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

Online Learning Resources:

1. http://peterindia.net/AILinks.html

COURSE STRUCTURE

A33110–Theory of Computation and Compiler Design

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.CourseObjectives:

The objectives of this course are to learn

- Types of grammars and models of automata.
- Limitationofcomputation:Whatcanbeandwhatcannotbe computed.
- Establishingconnectionsamonggrammars,automataandformallanguages.

Pre-requisite

2.CourseOutcome:

Aftersuccessfullycompletingthecoursethestudentshouldbeableto

A33110.1 Compare and analyze different computational models.

A33110.2 Apply regular expressions to computer languages.

A33110.3 Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.

A33110.4 Design parsers using top-down as well as bottom-up paradigms

A33110.5 Understanding the intermediate code generation.

3.Course Syllabus:

Unit:1 Finite Automata

Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - NFA with epsilon transitions – NFA without epsilon transition, conversion of NFA to DFA, Equivalence of NFA and DFA – minimization of DFA.

Unit:2 Regular Expression

Regular Expression - FA and Regular Expressions: FA to regular expression and regular expression to FA- - Pattern matching and regular expressions - Regular grammar and FA-Pumping lemma for regular languages - Closure properties of regular languages.

Unit:3 Context Free Grammars

Context-Free Grammar (CFG) – Derivations- Parse Trees - Ambiguity in CFG - Left recursion and Left factoring. Simplification of CFG – Elimination of Useless symbols, Unit productions, Null productions.

Unit:4 Syntax Analysis

Top-Down Parsing - Bottom-Up Parsing - Operator-Precedence Parsing – LRParsers, SLR, CLR, LALR.

Unit:5 Intermediate Code Generation & Code Optimization

Intermediate Languages – Declarations - Assignment Statements-Boolean Expressions - Case Statements – Back patching. Organization of code optimizer, basic blocks and flow graphs, optimization of basic blocks.

4.Text Book(s)

1. J. E.Hopcroft,R.MotwaniandJ.D.Ullman,–IntroductiontoAutomataTheory,Languages and Computation‖, Third Edition, Pearson Education, India 2008. ISBN: 978-8131720479

2. K. Peter Linz,–AnIntroductiontoFormal Languages andAutomata‖,SixthEdition,Jones& Bartlett, 2016. ISBN: 978-9384323219

Reference Books

1. K.KrithivasanandR.Rama,—IntroductiontoFormalLanguages,AutomataandComputation‖,Pearson Education, 2009. ISBN: 978-8131723562

2. Michael Sipser, Introduction of the Theory and Computation, Cengage; 3rd edition, 2014, ISBN:978-8131525296

3. DexterC.Kozen,–AutomataandComputability‖,Springer;Softcoverreprintoftheoriginal1sted.1997 edition. 2012

4. JohnCMartin,—IntroductiontoLanguagesandtheTheoryofComputation‖,McGrawHillPublishing Company, Fourth Edition, 2011.

COURSE STRUCTURE

A33111 – Machine Learning

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

The course is introduced for students to

- Understand basic concepts of Machine Learning
- Study different learning algorithms
- Illustrate evaluation of learning algorithms

Pre-requisite **Fundamentals of Computers and Programming**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33111 .1 Identify machine learning techniques suitable for a given problem.
A33111 .2 Solve the problems using various machine learning techniques.
A33111 .3 Design application using machine learning techniques.
A33111 .4 Able to apply Regression methods for a given problem.
A33111 .5 Design of clustering techniques for a given problem.

3.Course Syllabus:

UNIT – I **Introduction to Machine Learning &Preparing to Model**

What is Machine Leaning?, Types of machine Learning.

Preparing to Model: Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing.

UNIT – II **Evaluation &Basics of Feature Engineering**

Introduction, selecting a Model, training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model.

Basics of Feature Engineering: Introduction, Feature Transformation, Feature Subset Selection

UNIT – III **Bayesian Concept Learning & Supervised Learning: Classification**

Introduction, Why Bayesian Methods are Important? Bayes' Theorem, Bayes' Theorem and Concept Learning, Bayesian Belief Network.

Supervised Learning: Classification: Introduction**,** Example of Supervised Learning**,** Classification Model**,** Classification Learning Steps**,** Common Classification Algorithms-*k*-Nearest Neighbour(*k*NN), Decision tree, Random forest model, Support vector machines

UNIT – IV **Supervised Learning: Regression**

Introduction, Example of Regression, Common Regression Algorithms-Simple linear regression, Multiple linear regression, Assumptions in Regression Analysis, Main Problems in Regression Analysis.

UNIT – V

Unsupervised Learning

Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering – Clustering as a machine learning task, Different types of clustering techniques, Partitioning methods

K-Medoids: a representative object-based technique, Hierarchical clustering, Density-based methods-DBSCAN

4.Textbooks:

1) Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Books:

1. EthernAlpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2. Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series,2014.
3. Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

Online Learning Resources:

1. Andrew Ng, “Machine Learning Yearning”
2. https://www.deeplearning.ai/machine-learning- yearning/
3. ShaiShalev-Shwartz , Shai Ben-David, “Understanding Machine Learning: From Theory to Algorithms” , Cambridge University Press
4. https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

COURSE STRUCTURE

A33112–Artificial Intelligence Lab

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1.Course Objectives:

- To teach the methods of implementing algorithms using artificial intelligence techniques
- To illustrate search algorithms

To demonstrate the building of intelligent agents

Pre-requisite **Fundamental Programming**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33112.1 Implement search algorithms

A33112.2 Solve Artificial intelligence problems

A33112.3 Design chatbot and virtual assistant

3.List of Experiments:

1. Write a program to implement DFS and BFS
2. Write a Program to find the solution for traveling salesman Problem
3. Write a program to implement Simulated Annealing Algorithm
4. Write a program to find the solution for the Wumpus world problem
5. Write a program to implement 8 puzzle problem
6. Write a program to implement Towers of Hanoi problem
7. Write a program to implement A* Algorithm
8. Write a program to implement Hill Climbing Algorithm
9. Build a Chatbot using AWS Lex, Pandora bots.
10. Build a bot that provides all the information related to your college.
11. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
12. The following is a function that counts the number of times a string occurs in another string:

```
# Count the number of times string s1 is found in string s2
defcountsubstring(s1,s2):
count = 0
for i in range(0,len(s2)-len(s1)+1):
if s1 == s2[i:i+len(s1)]:
count += 1
return count
```

For instance, countsubstring('ab','cabalaba') returns 2.

13. Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).

4.References:

1. David Poole, Alan Mackworth, Randy Goebel," Computational Intelligence: a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
4. Artificial Neural Networks, B. Yagna Narayana, PHI
5. Artificial Intelligence, 2nd Edition, Erich and Knight, TMH.
6. Artificial Intelligence and Expert Systems, Patterson, PHI.

Online Learning Resources/Virtual Labs:

1. https://www.tensorflow.org/
2. https://pytorch.org/
3. https://github.com/pytorch
4. https://keras.io/
5. https://github.com/keras-team
6. http://deeplearning.net/software/theano/
7. https://github.com/Theano/Theano
8. https://caffe2.ai/
9. https://github.com/caffe2
10. https://deeplearning4j.org/Scikit-learn:https://scikit-learn.org/stable/
11. https://github.com/scikit-learn/scikit-learn
12. https://www.deeplearning.ai/
13. https://opencv.org/
14. https://github.com/qqwweee/keras-yolo3
15. https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/
16. https://developer.nvidia.com/cuda-math-library

COURSE STRUCTURE

A33113 –Machine Learning Lab

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1.Course Objectives:

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.

Pre-requisite **Machine learning Theory, Fundamentals of programming, Python programming**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33113 .1 Understand the Mathematical and statistical prospectives of machine learning algorithms through python programming

A33113 .2 Appreciate the importance of visualization in the data analytics solution.

A33113 .3 Derive insights using Machine learning algorithms

3.Course Syllabus:

List of Experiments:

Note:

a. The programs can be implemented in either JAVA or Python.
b. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
c. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Linear Regression to predict for a test examples.
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Logistic Regression to predict for a test examples.
5. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
6. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

4.Projects

1. Predicting the Sale price of a house using Linear regression
2. Spam classification using Naïve Bayes algorithm

References:

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020.

Online Learning Resources/Virtual Labs:

1) Machine Learning A-Z (Python & R in Data Science Course) | Udemy
2) Machine Learning | Coursera

COURSE STRUCTURE

A33114–Web Application Development

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	14	0	28	2	40	60	100

1.Course Objectives:

- This course introduces students to developing web applications. This course presents the basics of HTML5 and CSS3, Other HTML tags for Web application Development. Learn to create links in HTML, Uses of HTML forms. Introduction to the use of Reactstrap for Bootstrap 4-based responsive UI design. React router and its use in developing single-page applications, designing controlled forms. Redux and use it to develop React-Redux powered applications, client-server communication and the use of REST API on the server side, React primitives render to native platform UI.

Pre-requisite **Fundamentals of Programming and Internet**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33114.1 Programming skills in Html5, CSS3, Bootstrap 4.

A33114.2 Developing skills of Web Applications user interactions using JavaScript (i.e. ES6+)

A33114.3 Web application Development Database with React and React Native.

3.Course Syllabus:

List of Experiments:

Week – 1: HTML LAYOUTS AND LINKS a. Develop a web application to control over different layouts. b. Create a webpage with HTML describing your department use paragraph and list tags. c. Apply various colors to suitable distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags. d. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.

Week – 2: WEB APLLICATION DESIGN FORMTTING a. Develop a web application with background banner image and navigation menus. b. Develop a web application with responsive images. c. Develop a web application using left menu. d. Develop setting to change the theme of entire web Application.

Week – 3: INTRODUCTION TO RESPONSIVE INTERFACE USING BOOTSRAP. a. Write code for developing responsive web application with Admin panel and tables with static data.

Week – 4: BUIDLING INTERFACES USING JAVASCRIPT a. Set up the Folder Structure. b. Write the Model code and initialize the application. c. Implement the list objects and use cases. d. Implement the create object use case. e. Implement the update object use case.

Week – 5: INTRODUCTION TO INTERATIVE FORMS AND AJAX DATA BINIDNG

a. Developing Web Page Styles using JavaScript and CSS, b. Develop Script interactive forms c. Data binding using Ajax.

Week – 6: REACT ENVIRONMENT SETUP

b. Integration with Existing Apps. c. Running on Device. d. Debugging e. Testing f. Write source code using Typescript.

Week – 7: PROGRAMMING WITH REACT

a. Basics Interactive examples. b. Function Components and Class Components c. React Native Fundamental, Handling Text Input, d. Using a scroll View, using List View. e. Platform Specific Code.

Week – 9: PHP SESSIONS BOX React FOR DATA VISUALIZATION

a. Introduction and scaffolding the Project. b. Pages and Layout. c. Working with an API, CSS-in-JS. d. Dynamic Pages and React Hooks. e. Custom React Hooks, Dynamic CSS-in-JS. f. Finishing up and Deployment. g. Optimization and PWA.

Week – 10: CHAT APPLICATION

a. Firebase Environment. Introduction and Scaffolding the project. b. Private and Public pages, Context API. c. Creating Side bar and Dashboard d. Creating and displaying Chat Rooms. e. Creating Layout for Chat page.

4.References:

Reference Books:

1. Adam Boduch and Roy Derks, "React and React Native: A Complete Hands-on Guide to Modern Web and Mobile Development with React.js", 3rd Edition, 2020.

2. W Hans Bergsten, "Java Server Pages", O'Reilly, 3rd Edition, 2003.

3. D. Flanagan, "Java Script", O'Reilly, 6th Edition, 2011. 4. Jon Duckett, "Beginning Web Programming", WROX, 2nd Edition, 2008.

Online Learning Resources/Virtual Labs:

1. https://nodejs.org/en/
2. https://expressjs.com/
3. https://www.mongodb.com/
4. https://reactjs.org/
5. https://www.netlify.com/

COURSE STRUCTURE

A30034 –GENDER SENSITIZATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100*	---	100*

1.CourseObjectives:

The main objective of this course is to develop students' sensibility with regard to issues of gender in contemporary India and to provide a critical perspective on the socialization of men and women. It also introduces students to information about some key biological aspects of genders to expose the students to debates on the politics and economics of work. This course helps the students to reflect critically on gender violence.

Pre-requisite **NIL**

2.CourseOutcomes(CO):

A30034 .1 Develop a better understanding of important issues related to gender in contemporary India
A30034 .2 Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
A30034 .3 Acquire insight into the gendered division of labour and its relation to politics and economics
A30034 .4 Equip to work and live together as equals
A30034 .5 Develop a sense of appreciation of women in all walks of life

3.Course Syllabus

Unit:1 **UNDERSTANDING GENDER**

Gender: Why should we study it Socialization: Making Women, Making Men Introduction, preparing for Woman hood, growing up Male, First lessons in Caste, Different Masculinities

Unit:2 **GENDER AND BIOLOGY**

Missing Women: Sex Selection and its consequences Declining Sex Ratio, Demographic Consequences Gender Spectrum: Beyond the Binary Two or Many? Struggles with Discrimination, Additional Reading: Our Bodies, Our Health.

Unit:3 **GENDER AND LABOUR**:

Housework: The Invisible Labour "My Mother Doesn't Work". "Share the Load", Women's Work: Its Politics and Economics Fact and Fiction, Unrecognized and Unaccounted work

Unit:4 **ISSUES OF VIOLENCE**

Sexual Harassment: Say No! Sexual Harassment, not Eve-Teasing-Coping with Everyday Harassment Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Unite [Film], Rebuilding Lives Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life."

Unit:5 **GENDER STUDIES**:

Knowledge: Through the Lens of Gender Point of View, Gender and the Structure of Knowledge. Who's History? Questions for Historians and Others Reclaiming a Past, Writing other Histories.

4.Text Book(s)

1. Suneeta, Uma Bhrugubanda, *Towards a world of equals: A Bilingual Textbook on gender*

ReferenceBooks

1. Sen, Amartya. "More than one Million Women are Missing." New York Review of Books 37,20 (20 December1990). Print
2. TripiLahiri, By the Numbers: Where Indian Women Work, Women's Studies Journal(14November2012)
3. http://blogs.wsj.com/Indiarealtime/2012/11/14/by-the numbers where-Indian-Women-work/

COURSE STRUCTURE

A33124 -Big Data Technologies

(Professional Elective Course– I)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- Understand Big Data Analytics for different systems like Hadoop.
- Discuss the design of Hadoop File System.
- Explore different tools for analysing Big Data.
- Understand the importance of Big Data in comparison with traditional databases.

Pre-requisite **Data base Management Systems**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33124 .1 Outline the importance of Big Data Analytics

A33124 .2 Obtain knowledge about working of Hadoop File System.

A33124 .3 Analyze Big Data using different tools.

A33124 .4 Apply Hadoop map Reduce programming for handing Big Data

3.Course Syllabus

UNIT – I **Introduction to Big Data**

Introduction to Big Data. What is Big Data? Why Big Data is Important. Meet Hadoop Data, Data Storage and Analysis, Comparison with other systems, Grid Computing. A brief history of Hadoop. Apache Hadoop and the Hadoop Ecosystem.

UNIT – II **HDFS Design**

The design of HDFS. HDFS concepts. Command line interface to HDFS. Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model.

UNIT – III **Analyzing data with UNIX tools**

Introduction. Analyzing data with UNIX tools. Analyzing data with Hadoop. Java MapReduce classes (new API). Dataflow, combiner functions, Running a distributed MapReduce Job.

UNIT – IV **Classic Map reduce**

Classic Map reduce. Job submission. Job Initialization. Task Assignment. Task execution Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types.

UNIT – V **Hive**

The Hive Shell. Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive QI. Hbasics. Concepts. Implementation.

4.Textbooks:

1. TomWhite, Hadoop,"TheDefinitiveGuide", 3rdEdition, O'ReillyPublications, 2012.
2. DirkdeRoos, Chris Eaton, George Lapis, PaulZikopoulos, TomDeutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1stEdition, TMH, 2012.

Reference Books:

1. Big Data and Health Analytics, Katherine Marconi, and Harold Lehmann.
2. Analytics in a Big Data World : The Essential Guide to Data Science and its Applications by Bartbaesens , Wiley publications.

Online Learning Resources:

1)Big Data Technologies: Big Data Technologies - Javatpoint.
2)Big Data Technologies- An Overview: Big Data Technology - an overview | ScienceDirect Topics.
3)Big Data Computing – NPTEL+

COURSE STRUCTURE

A33125 -Data Communication

Professional Elective Course– I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

The course is designed to

- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Explore the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Familiarize with the applications of Internet
- Elucidate the design issues for a computer network

Pre-requisite **Fundamentals of Computers, Operating systems**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33125 .1 Identify the software and hardware components of a Computer network
A33125 .2 Design software for a Computer network
A33125 .3 Develop new routing, and congestion control algorithms
A33125 .4 Assess critically the existing routing protocols
A33125 .5 Explain the functionality of each layer of a computer network
A33125 .6 Choose the appropriate transport protocol based on the application requirements

3.Course syllabus

UNIT – I **Computer Networks and the Internet**

Introduction to networks, internet, protocols and standards, the OSI model, layers in OSI model, TCP/IP suite, Addressing
Physical Layer: transmission media, circuit switched networks, Datagram networks, virtual circuit networks

UNIT – II **The Data Link Layer, Access Networks, and LANs**

Data Link layer Design issues, Error control and Detection-Parity, Cyclic Redundancy Check, Elementary Data link protocols-Simplex Protocol, Stop-and-Wait- protocol, Sliding Windows Protocol-Stop and wait ARQ, Go-Back-N, Selective Repeat, Multiple Access Control sub layer-Channel allocation Problem, MAC Protocols- Aloha, CSMA/CD,CSMA/CA.

UNIT – III **The Network Layer**

Functions of Network Layer, Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service

UNIT – IV **The Transport Layer**

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT – V **Principles of Network Applications**

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

4.Textbooks:

1. Andrew S. Tanenbaum, David j. wetherall, Computer Networks, 5th Edition, PEARSON.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 7th edition, Pearson, 2019.

Reference Books:

1. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, ShakilAkthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

Online Learning Resources:

1)Computer Networks and Internet Protocol:Computer Networks and Internet Protocol - Course (nptel.ac.in).

2)Basics of Computer Networking:Basics of Computer Networking - GeeksforGeeks.

COURSE STRUCTURE

A33126-Data Visualization Techniques
(Professional Elective Course– I)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- Discuss the importance of Data Visualization
- Demonstrate story telling
- Explain the environment of Tableau

Pre-requisite: **DBMS**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33126.1 Effectively present the data

A33126.2 Draw insights from the data

1. Use Tableau

3 Course Syllabus

UNIT – I

Introduction, The importance of Context, Choosing and effective visual

UNIT – II

Clutter is your enemy, Focus your audience's attention, Lessons in Storytelling

UNIT – III

Communicating data: A step in the process, a model of communication, Three types of communication problems, six principles of communicating data.

Introduction to Tableau: Using Tableau, Tableau products, Connecting to data.

How much and How many: Communicating how much, communicating how many

Ratios and Rates: Ratios, Rates

UNIT – IV

Proportions and Percentages: Part to whole, current to historical, actual to target.

Mean and Median

Variation and Uncertainty: Respecting variation, Variation over time-Control charts, Understanding uncertainty

UNIT – V

Multiple Quantities: Scatterplots, Stacked Bars, Regression and Trend Lines, The Quadrant Chart

Changes over time: The origin of time charts, the line chart, the dual axis line chart, the connected scatterplot, the date filed type and seasonality, the timeline, the slope graph

Maps and Location: One special map, circle maps, filled maps, dual encoded maps.

4.Textbooks:

1. Cole NussbaumerKnaflic, Storytelling with data, Wiley
2. Ben Jones, Communicating Data with Tableau, O'Reilly

Reference Books:

1. A Julie Steele and Noah Iliinsky, Designing Data Visualizations: Representing Informational Relationships, O'Reilly.
2. Andy Kirk, Data Visualization: A Successful Design Process, PAKT.
3. Scott Murray, Interactive Data Visualization for Web, O'Reilly.

Online Learning Resources:

1. Data Analysis and Visualization Foundations | Coursera
2. Data Visualization | Coursera

COURSE STRUCTURE

A33127 –Image Processing
(Professional Elective Course– I)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1 .Course Objectives:

- Discuss the format of images
- Explore the APIs of python related to image processing

Pre-requisite

2 .Course Outcomes (CO):

After completion of the course, students will be able to

A33127 .1 Understand the format of different type of images

A33127 .2 Apply the functionality of python for image processing

A33127 .3 Understand opencv image processing

3.Course Syllabus

UNIT – I **Image Formation & 3-D Imaging**

Introduction to Image Formation:

Introduction, World and camera coordinates, Ideal Imaging: Perspective Projection, Real Imaging, Radiometry of Imaging, Liner System Theory of Imaging, Homogeneous Coordinates

Introduction to 3-D Imaging:

Basics, Depth from Triangulation, Depth from Time-of-Flight, Depth from Phase: Interferometry, Shape from Shading, Depth from Multiple Projections: Tomography

UNIT – II **Image Processing**

Introduction to Image Processing:

Images, Pixels, Image Resolution, PPI and DPI, Bitmap Images, Lossless Compression, Lossy Compression, Image File Formats, **Color Spaces**: RGB, XYZ, HSV/HSL, LAB, LCH, YPbPr, YUV, YIQ, **Advanced Image Concepts:** Bezire Curve, Ellipsoid, Gamma Correction, Structural Similarity Index, Deconvolution, Homography, Convolution

UNIT – III **Basics of Python and Scikit Image**

Basics of Python:

Variables and Data Types, Data Structures, Control Flow Statements, Conditional Statements, Functions

Scikit Image:

Uploading and Viewing an Image, Getting Image Resolution, Looking at Pixel Values, Converting Color Space, Saving an Image, Creating Basic Drawings, Doing Gamma Correction.

Rotating, Shifting, and Scaling Images, Determining Structural Similarity.

UNIT – IV **Advanced Image Processing Using OpenCV**

Blending Two Images, Changing Contrast and Brightness, Adding Text to Images, **Smoothing Images:** Median Filter, Gaussian Filter, Bilateral Filter.

Changing the Shape of Images, Effecting Image Thresholding, Calculating Gradients, Performing Histogram Equalization.

UNIT – V **Image Processing Using Machine Learning & Real-Time Use Cases**

Feature Mapping Using the SIFT Algorithm, Image Registration Using the RANSAC Algorithm: estimate_ affine, residual lengths, processing the Images, The Complete code.
Image Classification Using Artificial Neural Networks, Image Classification Using CNNs,
Image Classification Using Machine Learning Approaches: Decision Trees, Support Vector Machines, Logistics Regression, Code, Important Terms

Introduction to Real-Time Use Cases:
Finding Palm Lines, Detecting Faces, Recognizing Faces, Tracking Movements, Detecting Lanes

4.Textbooks:

1. Digital Image Processing by Rafael C. Gonzalez,4th Edition, 2018
2. Hands-On Image Processing with Python: Expert techniques for advanced image analysis and effective interpretation of image data,by SandipanDey, 2018

Reference Books:

1. Digital Image Processing-Bernd Jahne,2005

Online Learning Resources:

1. How to Implement Artificial Intelligence for Solving Image Processing Tasks | Apriorit
2. Image Processing for Engineering and Science | Coursera

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33151 – Advanced R Programming for Data Analytics in Business

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

The course is introduced for students to

- Understand basic concepts of R Programming
- Study different learning algorithms
- Illustrate evaluation of learning algorithms

Pre-requisite Fundamentals of Computers and Programming

2.Course Outcomes (CO):

After completion of the course, students will be able to

CO1. Identify machine learning techniques suitable for a given problem.
CO2. Solve the problems using various machine learning techniques.
CO3. Develop application using machine learning techniques.
CO4. Able to apply Regression methods for different applications.
CO5. Design of clustering techniques for a given problem.

3.Course Syllabus:

UNIT - I

Advanced R programming for Data Science: Introduction and Background

Fundamentals of R: Installation and set-up, set working directory, packages, and libraries; R operators: Arithmetic, assignment, comparison, and logical operators; Working with different data types; Vector creation and manipulation; Miscellaneous functions: Sequence, repetition, sorting, generate random numbers, user-defined functions, lapply, sapply, and tapply function; Factor variables, Indexing, Data coercion, conditional statements

Introduction to Data Visualization with R: Basic Plotting types: Barchart, Pie Chart, Histogram, Density plot, Boxplot; Plot customization: Adding legend, Adding color in plots, Adding axis labels and chart title, Modifying axis and scales; Overlay plots in R

UNIT - II

Advanced Data Visualization with ggplot2

Key components; Color, size, shape, and other aesthetic attributes; Faceting: Wrap faceting and Grid faceting; Plot geoms: Adding a smoother to a plot, Boxplots, jitterplots, histogram, frequency polygons, Time series with line and path plots; Modifying the axes; Quick plots; Correlation matrix with ggplot.

Exploratory Data Analysis (EDA) and Data Wrangling: Reading and writing the data, exporting, and saving a data frame; Data handling and cleaning: Recording the variables, dealing with NAs, adding a row and column to the data frame, wide to long data formats, merging the data frames.

UNIT - III

Handling Complex Date and Time Objects:

Getting the current date and time, POSIX classes (POSIXct and POSIXlt), Parsing dates, Date and time components, Dates not in Standard Format; Operations on dates: subtract/add, finding difference, generating a sequence, truncate; Time zones; Time intervals: Interval and overlaps;

Periods and durations; Date arithmetic; Rounding the dates

Basic Statistics with R: Measures of central tendency, Measures of Variability, Measures of Shape; summary statistics by group; Dealing with outliers: Truncate and Winsorize.

Probability and Stochastics with R: Probability Distribution, Binomial Distribution, Normal Distribution, Sampling Distribution, Types of Sampling: Probability vs non-Probability

UNIT – IV **Advanced Inferential Statistics with R:**

One-sample test, two-sample test, T statistics, Z statistics, Test with Proportion, Test with variances; ANOVA: one way and two ways Introduction to Model Building and Evaluation: Simple and Multiple Linear Regression Modeling (SLRM): Linearity and normality, Fitting SLRM, Storing and printing the regression results, Interpretation of the regression results, Diagnosis of the fitted model, Tests for autocorrelation and heteroskedasticity, Computation of robust standard errors, and Visualization of regression results

Introduction to Time-series Modelling and Panel Data Methods Time-series modelling, issues with time-series data, basic time-series properties, Introduction to pandel data, Reading & Writing Panel Data, Panel Data Manipulation, Outlier Treatment, Panel Data Visualization, Descriptive Statistics Pooled OLS, Fixed Effect Estimation, LSDV Estimation, Random Effect Estimation, Diagnostic Tests, Residual Analysis, Robust Estimation

UNIT – V **Advanced Non-Linear Modelling and Evaluation**

Quantile Regression Method, Reading & Writing Quantile Data, Quantile Data Manipulation, Outlier Treatment, Quantile Data Visualization, Diagnostic Tests, Residual Analysis, Robust Estimation, Advanced Classification Methods: Logit/Probit Regression Modelling

Introduction to Classification Algorithms, Linear probability models, Introduction to Logit/Probit Modelling, Thresholding and Classification Matrix, ROC Curve, Parameter Interpretation, Maximum Likelihood Estimation, and Goodness-of-Fit measures.

4.Textbooks:

1. Hadley Wickham, “R for Data Science,” O’Reilly, 1st Edition
2. Robert I. Kabacoff, “R in Action: Data Analysis and Graphics with R,” Manning, 2nd Edition
3. Chris Chapman and Elea McDonnell Feit, “R for Marketing Research and Analytics,” Springer, 2nd Edition

Reference Books:

1. John Fox and Sanford Weisberg, “An R Companion to Applied Regression,” Sage, 3rd Edition.
2. Hadley Wickham, “ggplot2 Elegant Graphics for Data Analysis,” Springer, 2nd Edition

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc24_mg113/preview

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
(AUTONOMOUS)

COURSE STRUCTURE

VI - Semester

COURSE STRUCTURE
A33116 – Deep Learning

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Explore Fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyse the key parameters and hyper parameters in a Neural network's architecture

Pre-requisite Machine Learning

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33116.1 Demonstrate the mathematical foundation of neural network
A33116.2 Understand the architecture of a deep neural network
A33116.3 Build a Convolutional neural network
A33116.4 Build and train RNN and LSTMs

3.Course Syllabus:

UNIT – I **Deep Learning and Linear Algebra**

Deep Learning: AI vs ML vs DL vs DS, Deep Learning, why Deep learning, architecture, types of deep learning, applications, advantages and disadvantages.
Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

UNIT – II **Machine Learning basics, Deep Feed forward Networks**

Deep Feed forward Networks: ANN, Perceptron, forward propagation, backward propagation, activation function, chain rule of derivatives, vanishing, gradient problem, and loss function.
Optimizers: Gradient descent, stochastic gradient descent, mini batch SGD, SGD with momentum, adagrad.

UNIT – III **Regularization for Deep Learning, Deep Models**

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Early stopping, Multitask Learning.

UNIT – IV **Convolutional Networks**

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

UNIT – V **Sequence Modeling**

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, LSTM.

4.Textbooks and Materials:

Textbooks:

1) Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MITPress, 2016.
2) Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O’Reilly Media, First Edition, 2017.

Reference Books:

1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O’Reilly, Shroff Publishers,2019.
2) Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O’Reilly, Shroff Publishers, 2019.

Online Learning Resources:

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33117 –Cryptography and Network Security

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted email message.
- Discuss Web security and Firewalls

Pre-requisite: Computer Networks

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33117.1 Understand basic cryptographic algorithms, message and web authentication and security issues.

A33117.2 Identify information system requirements for both of them such as client and server.

A33117.3 Understand the current legal issues towards information security.

3.Course Syllabus:

UNIT – I **Security Concepts**

Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, key range and key size, possible types of attacks.

UNIT – II **Symmetric key Ciphers**

Block Cipher principles, DES, AES, RC5, Block cipher operation, Stream ciphers, RC4. Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT – III **Cryptographic Hash Functions**

Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signature. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Public – Key Infrastructure

UNIT – IV **Transport-level Security**

Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN.

UNIT – V **E-Mail Security**

Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Secure Inter-branch Payment Transactions.

4.Textbooks:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition

2. Cryptography and Network Security: AtulKahate, Mc Graw Hill, 3rd Edition

Reference Books:

1.Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.

2.Cryptography and Network Security: ForouzanMukhopadhyay, Mc Graw Hill, 3rd Edition

Information Security, Principles, and Practice: Mark Stamp, Wiley India.

COURSE STRUCTURE

A33118 –Natural Language Processing

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Understand approaches to syntax and semantics in NLP.
- Understand current methods for statistical approaches to machine translation.
- Understand language modeling.
- Understand machine learning techniques used in NLP.

Pre-requisite

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33118 .1 Understand the logic behind Natural languages
A33118 .2 Understand the significance of syntax and semantics of natural languages
A33118. 3 Process the Natural languages
A33118. 4 Verify the syntax and semantics of languages
A33118. 5 Design new natural languages

3.Course Syllabus:

UNIT – I **Introduction to Natural language**

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems,Different Levels of Language Analysis, Representations and Understanding, Organization ofNatural language Understanding Systems, Linguistic Background: An outline of English Syntax.

UNIT – II **Grammars and Parsing**

Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars,Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayes Rule, Shannon game, Entropy and Cross Entropy.

UNIT – III **Grammars for Natural Language**

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

UNIT – IV **Interpretation and Modelling**

Semantic Interpretation

Semantic & Logical form, Word senses & ambiguity, the basic logical form language, encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts &embedded sentences, Defining semantics structure model theory.

UNIT – V **NLP for Machine Learning and Deep Learning**

Why NLP,Examples ,Tokenization,Stemming, Lematization,Bag of words,Text Processing

4.Textbooks:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2.Multilingual Natural Language Processing Applications: From Theory to Practice-Daniel M.Bikel and ImedZitouni, Pearson Publications.
3.Natural Language Processing, A paninian perspective, AksharBharathi, VineetChaitanya, Prentice –Hall of India.

Reference Books:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.

3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

Online Learning Resources:

1. http://peterindia.net/AILinks.html

COURSE STRUCTURE

A33119 –Deep Learning Lab

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1.Course Objectives:

- Understand the context of Neural networks and deep learning.
- Introduce major Deep learning algorithms, the problem settings, and their applications to solve real world problems

Pre-requisite **Machine learning Theory, Deep Learning Theory, Fundamentals of programming, Python programming**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33119.1 Identify the Deep learning algorithms which are more appropriate for various types of learning tasks in various domains

A33119.2 Implementing Deep learning algorithms and solve real-world problems.

3.Course Syllabus:

List of Experiments:

1. Machine Learning Algorithm
    a. Implementing Linear Regression using sklearn.
    b. Implementing Logistic Regression using sklearn.
2. Train the model to add two numbers and report the result.
3. Train the model to multiply two matrices and report the result using keras.
4. Train the model to print the prime numbers using Keras
5. Create a simple Recurrent Neural Network in keras
6. Creating an RNN model for analyzing movie reviews.
    a. Prepare IMDB data for movie review classification problem.
    b. Train the model with embedding and simple RNN layers.
    c. Plot the Results
7. Creating LSTM model for stock prediction

4.References:

1)Ian Goodfellow, YoshuaBengio, AaraonCourville, “Deep Learning (Adaptive Computation and Machine Learning series)”, MIT Press, 2016.

Online Learning Resources/Virtual Labs:

1) Introduction to Deep Learning Course | Introduction to Deep Learning Course (rses-dl-course.github.io)

2) Deep Learning | Introduction to Long Short Term Memory - GeeksforGeeks

COURSE STRUCTURE

A33122–Cryptography and network security Lab

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1.Course Objective

- To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
- To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
- To familiarize symmetric and asymmetric cryptography.

2.Course Outcome CO:

At the end of this course students will be able to:

A33122.1 Identify basic security attacks and services
A33122.2 Use symmetric and asymmetric key algorithms for cryptography
A33122.3 Make use of Authentication functions

3.Course Syllabus:

List of Experiments:

1 Write a C program that contains a string (char pointer) with a 1 value \Hello World'. The program should XOR each character in this string with 0 and displays the result.

2 Write a C program that contains a string (char pointer) with a 2 value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result

3 Write a Java program to perform encryption and decryption using CeaserCipheralgorithms

4 Write a Java program to perform encryption and decryption using Substitution Cipheralgorithms

5 Write a C/JAVA program to implement the Euclidean algorithms

6 Write a Java program to perform encryption and decryption using Hill Cipheralgorithms

7 Write a Java program to implement the DES algorithm.

8 Write a C/JAVA program to implement the BlowFishalgorithmlogic

9 Write a C/JAVA program to implement the Euclidean algorithms

10 Write a Java program to implement RSA Algoithm

4.Textbooks:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: AtulKahate, Mc Graw Hill, 3rd Edition

Reference Books:

1.Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2.Cryptography and Network Security: ForouzanMukhopadhyay, Mc Graw Hill, 3rd Edition Information Security, Principles, and Practice: Mark Stamp, Wiley India.

COURSE STRUCTURE

A33121 –Natural Language Processing Lab

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1.Course Objectives:

- To introduce the students with the basics of NLP which will empower them for developing advanced NLP tools and solving practical problems in the field.

Pre-requisite **Fundamentals of Programming**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33121.1 Understand approaches to syntax and semantics in NLP.

A33121.2 Analyse grammar formalism and context free grammars

A33121.3 Apply the statistical estimation and statistical alignment models

A33121.4 Apply Rule based Techniques, Statistical Machine translation (SMT), word alignment, phrase-based translation

A33121.5 Have the skills (experience) of solving specific NLP tasks, which may involve programming in Python, as well as running experiments on textual data.

3.Course Syllabus:

List of Experiments:

1. Word Analysis
2. Word Generation
3. Morphology
4. N-Grams
5. N-Grams Smoothing
6. POS Tagging: Hidden Markov Model
7. POS Tagging: Viterbi Decoding
8. Building POS Tagger
9. Chunking
10. Building Chunker

4.References:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2.Multilingual Natural Language Processing Applications: From Theory to Practice-Daniel M.Bikel and ImedZitouni, Pearson Publications. 2012.
3.Natural Language Processing, A paninian perspective, AksharBharathi, VineetChaitanya, Prentice – Hall of India. 1995.

Online Learning Resources/Virtual Labs:

1. Natural Language Processing in TensorFlow | Coursera
2. https://nlp-iiith.vlabs.ac.in/List%20of%20experiments.html

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30021 –Professional English and Communication Skills

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	14	0	28	3	40	60	100

1.Course Description

Course Overview

English language connects people from different regions, cultures and nations. English language has a determinating effect on the job opportunities and professional growth of the student. Due to the changes in the world economy, Multinational companies have gained ground and also have become more competent. The ability to use a language efficiently is very much required to remain employable. The ability to express fluently in both written as well as oral form of language is very much essential for the career growth.In the corporate world, proper English means both the ability to make grammatically correct sentences and also other related skills for effective communication like presentation skills, convincing and negotiation skills and interpersonal. The student has to update according to the ongoing changes and advancements. The situation in most of the companies has changed, the mere domain knowledge doesn't guarantee one a good job.The emphasis should be on functional English usage exercises. In order to strengthen, the English speaking ability of the present generation, the syllabus framed focuses on practical oriented exercises and real life situations than mere study of literature.

Pre-requisite Communicative English,Communicative English Lab

2.Course Outcomes (CO):

After completion of the course, students will be able to

A30021.1 Use techniques at different levels to convince the employers.

A30021.2 Use technology to convince the audience with skills.

A30021.3 Realize where exactly he has to improve.

A30021.4 Communicate effectively using the ICT tools.

A30021.5 Learn and be competent in heterogeneous groups.

3.Course Syllabus:

List of Experiments:

1.Icebreaker activities
2. Listening Comprehension
3. Reading Comprehension
4. Power Point Presentation
5. Group Discussion
6. Debate
7. Project Report Writing
8. SWOT and TOWS Analysis
9. Profiling a Company
10. Email writing
11. Application Letter
12. Etiquettes

4.References:

1. Rizvi, M. Ashraf, *Effective Technical Communication,* Noida, McGraw-Hill Education. 2009.

Online Learning Resources/Virtual Labs:

1. Dhanavel, S P. *English for Communication Skills for Students of Science and Engineers*. New Delhi: Mittal Books India. 2009.
2. Lewis, Norman, *Word Power made Easy*. Haryana, Penguin Random House India. 2009.
3. Mohan, Krishna and N P Krishna, *Speaking English Effectively,* India, MacMillan.2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30036 –Indian Constitution and multiculturalism

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	3	100*	---	100*

1.Course Objectives:

The students will be able to learn:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

2.Course Outcomes (CO):

After completion of the course, students will be able to

A30036.1 Differentiate between structure and functions of state secretariat

A30036.2 Understand historical background of the constitution making and its importance for building a democratic India.

A30036.3 Understand the functioning of three wings of the government ie.executive, legislative and judiciary.

A30036.4 Understand the value of the fundamental rights and duties for becoming good citizen of India.

A30036.5 Analyze the decentralization of power between central, state and local selfgovernment.

A30036.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

3.Course Syllabus

Unit-I

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian ConstitutionSources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

Unit-II

Union Government and its Administration Structure of the Indian Union - Federalism - CentreState relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions.

Unit-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions.

Unit-IV

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI – ZillaParishath - Elected officials and their roles – CEO,ZillaParishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Unit-V

Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women.

4.Text Books:

1.Durga Das Basu, " Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi.

2. SubashKashyap, "Indian Constitution", National Book Trust.

References:

1) J.A. Siwach, "Dynamics of Indian Government & Politics".
2) H.M.Sreevai, "Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
3) J.C. Johari, "Indian Government andPolitics", Hans India
4) M.V. Pylee, "Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice", Hall of India Pvt. Ltd.. New Delhi

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details

COURSE STRUCTURE

A33128 –Computer Vision

Professional Elective Course– II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- The objective of this course is to understand the basic issues in computer vision and major approaches that address them.
- Students should be able to learn the Linear Filters, Segmentation by clustering, Edge detection.

Pre-requisite

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33128.1 Identify basic concepts, terminology, theories, models and methods in the field of computer vision.

A33128.2 Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition.

A33128.3 Develop the practical skills necessary to build computer vision applications.

A33128.4 Exposure to object and scene recognition and categorization from images.

3.Course Syllabus:

UNIT – I **LINEAR FILTERS**

Introduction to Computer Vision, Linear Filters and Convolution, Shift In variant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Technique: Normalized Correlation and Finding Patterns, Technique: Scale and Image Pyramids.

UNIT – II **EDGE DETECTION**

Noise- Additive Stationary Gaussian Noise, Why Finite Differences Respond to Noise, Estimating Derivatives - Derivative of Gaussian Filters, Why Smoothing Helps, Choosing a Smoothing Filter, Why Smooth with a Gaussian? Detecting Edges-Using the Laplacianto Detect Edges.

UNIT – III **TEXTURE**

Representing Texture – Extracting Image Structure with Filter Banks, Representing Texture Using the Statistics of Filter Outputs, Analysis (and Synthesis) Using Oriented Pyramids -The Laplacian Pyramid, Filters in the Spatial Frequency Domain, Oriented Pyramids.,

UNIT – IV **SEGMENTATION BY CLUSTERING**

What is Segmentation, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering
Pixels, Segmentation by Graph-Theoretic Clustering.

UNIT – V **RECOGNIZATION BY RELATIONS BETWEEN TEMPLATES**

Finding Objects by Voting on Relations between Templates, Relational Reasoning Using Probabilistic Models and Search, Using Classifiers to Prune Search, Hidden Markov Models, Application: HMM and Sign Language Understanding, Finding People with HMM.

4.Textbooks:

1. David A. Forsyth, Jean Ponce, Computer Vision- A Modern Approach, PHI, 2003.

Reference Books:

1. Geometric Computing with Clifford Algebras: Theoretical Foundations and Applications in Computer Vision and Robotics, Springer;1 edition,2001by Sommer.
2. Digital Image Processing and ComputerVision,1/e, by Sonka.
3. Computer Vision and Applications: Concise Edition (With CD) by Jack, Academy Press, 2000.

Online Learning Resources:

1. Introduction to Computer Vision and Image Processing | Coursera
2. Advanced Computer Vision with TensorFlow | Coursera

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33129 –Software Testing Methodologies

Open Elective Course– II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

1. To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.
2. To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
3. It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.
4. It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.
5. To learn the domain testing, path testing and logic based testing to explore the testing process easier.

Pre-requisite

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33129 .1 Know the basic concepts of software testing and its essentials.
A33129 .2 Able to identify the various bugs and correcting them after knowing the consequences of the bug.
A33129 .3 Use of program's control flow as a structural model is the corner stone of testing.
A33129 .4 Performing functional testing using control flow and transaction flow graphs.

3.Course Syllabus:

UNIT – I

Introduction:-Purpose of testing,Dichotomies,model for testing,consequences of bugs, taxonomy of bugs,Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT – II

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing,application of dataflow testing.

UNIT – III

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT – IV

Paths,Path products and Regular expressions:- path products &pathexpression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:- overview,decisiontables,pathexpressions,kv charts, specifications.

UNIT – V

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips. Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools

4.Textbooks:

1. Software Testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

Reference Books:

1. The craft of software testing – Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33130–Virtual Reality and Augmented Reality

Open Elective Course - III

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- Introduce to the design of visualization tools
- Demonstrate Virtual reality
- Learn Virtual reality animation and 3D Art optimization
- Understand the foundational principles describing how hardware, computer vision algorithms function
- Explore the history of spatial computing and design interactions

Pre-requisite **Fundamentals of virtual reality**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33130.1 Apply VR/MR/AR in various fields in industry
A33130.2 Design Data visualization tools
A33130.3 Design audio and video interaction paradigms
A33130.4 Apply technical and creative approaches to make successful applications and experiences.
A33130.5 Explain how the humans interact with computers

3.Course Syllabus:

UNIT – I

Computer generated worlds: what is augmented reality? what is virtual reality?
Understanding virtual space: defining visual space and content, defining position and orientation in three dimensions, navigation
The Mechanics of Sight: the visual path way, spatial vision, and Depth Cues.
Component Technologies of Head mounted Displays: Display fundamentals, related terminology and concepts, optical Architectures.

UNIT – II

Augmented Displays: Binocular augmenting displays, Monocular augmenting displays.
Fully immersive Displays: PC-Console driven displays, smartphone based displays, CAVES and Walls, Hemispheres and Domes.
The Mechanics of hearing: Defining sound, the auditory pathway, sound cues and localization, the vestibular system.
Audio displays: Conventional audio

UNIT – III

The Mechanics of Feeling: The Science of feeling, Anatomy and Composition of the skin.
Tactile and force feedback Devices: Haptic illusions, tactile feedback devices, Force feedback devices.
Sensors for tracking Position, and orientation and motion: introduction to sensor technologies, optical trackers, beacon trackers, electromagnetic trackers, inertial sensors, acoustic sensors.
Devices to enable navigation and interaction: 2D vs 3D interaction and navigation, the importance of a manual interface, hand and gesture tracking, whole body tracking, gaming and entertainment interfaces, navigating with your mind.

UNIT – IV

Gaming and Entertainment: Virtual reality and the arts, gaming, immersive video/ cinematic virtual reality.
Architecture and Construction: Artificial spaces, architectural design: Manage group architectures, Construction management, real estate sales applications, architectural acoustics.
Science and engineering: Simulate and innovate, naval architecture and marine engineering, automotive engineering, aerospace engineering, nuclear engineering and manufacturing.
Health and medicine: advancing the field of medicine, training applications, treatment applications.

UNIT – V

Aerospace and Defence: Flight simulation and training, mission planning and rehearsal, dismounted soldier situational awareness, advanced cockpit avionics, space operations.
Education: Tangible skills education, theory, knowledge acquisition and concept formation.
Information control and big data visualization: What is big data?, big data analytics and human vision.
Telerobotics and Telepresence: Defining Telerobotics and Telepresence, space applications and robonaut, undersea applications, Terrestrial and airborne applications.

4.Textbooks:

1. Steve Aukstakalnis, “Practical Augmented Reality”, Pearson Education, 2017.

Reference Books:

1. Erin Pangilinan, Steve lukas, and Vasanth Mohan, “Creating Augmented& Virtual Realities”, O’REILLY

Online Learning Resources:

1. https://www.coursera.org/learn/intro-augmented-virtual-mixed-extended-reality-technologies-applications-issues
2. https://www.coursera.org/learn/ar

COURSE STRUCTURE

A33131 –Predictive Analytics

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1.Course Objectives:

- Discuss the concept Predictive Analytics
- Illustrate the uses and applications of Predictive Analytics
- Demonstrate building of Predictive Analytics models

Pre-requisite **Data Analysis fundamentals**

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33131 .1 Visualize and explore data to better understand relationships among variables
A33131 .2 Understand how ensemble models improve predictions
A33131 .3 Organize the predictive modelling task and data flow
A33131 .4 Apply predictive models to generate predictions for new data
A33131 .5 Choose and implement appropriate performance measures for predictive models

3.Course Syllabus:

UNIT – I

Overview of Predictive Analytics: What Is Analytics? What Is Predictive Analytics? Business Intelligence Predictive Analytics vs. Business Intelligence, Predictive Analytics vs. Statistics, Predictive Analytics vs. Data Mining, Who Uses Predictive Analytics? , Challenges in Using Predictive Analytics, What Educational Background Is Needed to Become a Predictive Modeler?

Setting Up the Problem: Predictive Analytics Processing Steps: CRISP-DM, Business Understanding, Defining Data for Predictive Modelling, Defining the Target Variable, Defining Measures of Success for Predictive Models, Doing Predictive Modelling Out of Order, Case study- Recovering Lapsed Donors, Fraud Detection

UNIT – II

Data Understanding: What the Data Looks Like, Single Variable Summaries, Data Visualization in One Dimension, Histograms, Multiple Variable Summaries, Data Visualization, Two or Higher Dimensions, The Value of Statistical Significance, Pulling It All Together into a Data Audit.

Data Preparation: Variable Cleaning, Feature Creation.

UNIT – III

Item sets and Association Rules: Terminology, Parameter Settings, How the Data Is Organized, Measures of Interesting Rules, Deploying Association Rules, Problems with Association Rules, Building Classification Rules from Association Rules.

Descriptive Modelling: Data Preparation Issues with Descriptive Modelling, Principal Component Analysis, Clustering Algorithms.

Interpreting Descriptive Models: Standard Cluster Model Interpretation.

UNIT – IV

Predictive Modelling: Decision Trees, Logistic Regression, Neural Networks, K-Nearest Neighbour, Naïve Bayes, Regression Models, Linear Regression, Other Regression Algorithms.

Assessing Predictive Models: Batch Approach to Model Assessment, Assessing Regression Models.

UNIT – V

Model Ensembles: Motivation for Ensembles, Bagging, Boosting, Improvements to Bagging and Boosting, Model Ensembles and Occam's Razor, Interpreting Model Ensembles.

Text Mining: Motivation for Text Mining, A Predictive Modelling Approach to Text Mining, structured vs. Unstructured Data, Why Text Mining Is Hard, Data Preparation Steps, Text Mining Features, Modelling with Text Mining Features, Regular Expressions.

Model Deployment: General Deployment Considerations.

Case Studies: Survey Analysis Case Study, Help Desk Case Study.

4.Textbooks:

1. Dean Abbott, Applied Predictive Analytics, Published by Jhon Wiley &Sons, Inc,2014.

Reference Books:

1. Eric Siegel, Predictive Analytics, Published by Jhon Wiley & Sons, inc,2013.
2. Data Analytics using Python Kindle Editionby Bharti Motwani, 2020.

Online Learning Resources:

1. Predictive Analytics: Introduction to Business Forecasting | Udemy

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B.TECH. – COMPUTER SCIENCE AND ENGINEERING - ARTIFICIAL INTELLIGENCE (CAI)

VII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	Professional Elective-III	PE	3	0	0	3	40	60	100
	Professional Elective-IV	PE	3	0	0	3	40	60	100
	Professional Elective-V	PE	3	0	0	3	40	60	100
	Open Elective-III	OE	3	0	0	3	40	60	100
	Open Elective-IV	OE	3	0	0	3	40	60	100
A30022	***Professional Ethics**	HS	3	0	0	3	40	60	100
A33144	Computer Vision Lab	SC	1	0	2	2	40	60	100
A33145	**Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)**	PW	0	0	0	3	100	0	100
	TOTAL		**19**	**00**	**2**	**23**	**380**	**420**	**800**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									
Honors/Minor courses (The hours Distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

* The marks for Mandatory Courses are not considered for calculating SGPA

***There is a provision for the Universities/Institutions to implement AICTE course "Universal Human Values 2: Understanding Harmony" under Humanities and social mandatory science Elective in seventh semester for 3 credits.**

VIII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A33146	Project (Major Project)	PW	0	0	0	12	0	200	200
Internship (6 Months)									
	TOTAL		**0**	**0**	**0**	**12**	**0**	**200**	**200**

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH. – COMPUTER SCIENCE ANDENGINEERING - ARTIFICIAL INTELLIGENCE (CAI)

Professional Electives

Professional Elective – 3	
Course Code	
A33132	Intelligent Information Retrieval Systems
A33133	Reinforcement Learning
A33134	Introduction To Cyber Security
A33135	Object Oriented Analysis and Design
A33147	Responsible and safe AI System
A30579	Joy of Computing Using Python
Professional Elective – 4	
Course Code	**Title of the Course**
A33136	Fundamentals of Data Analytics
A33137	Recommender Systems
A33138	Autonomous Systems
A33139	Cloud Computing
A33148	Introduction to Industry 4.0 and Industrial Internet of Things
A30589	Social Network Analysis
Professional Elective – 5	
Course Code	**Title of the Course**
A33140	Fundamental of Data Centers
A33141	Block Chain Technology and Applications
A33142	AI For Image Analysis
A33143	Full Stack Software Development
A33149	Cloud Computing
A33150	Ethical Hacking

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(AUTONOMOUS)

COURSE STRUCTURE

VII - Semester

COURSE STRUCTURE

A33132 – INTELLIGENT INFORMATION RETRIEVAL SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description:

Course Overview:

This course provide the students with Knowledge of how to retrieve information, indexing and how to use it, how to automate indexing.

Pre-requisite

DBMS

2.Course Outcomes (CO):

After completion of the course, students will be able to:

A33132.1 Recognize the Boolean Model, Vector Space Model, and Probabilistic Model.
A33132.2 Understand retrieval utilities.
A33132.3 Understand different formatting tags
A33132.4 Understand cross-language information retrieval
A33132.5 Understand the clustering techniques

3.Course Syllabus:

UNIT – I **Introduction**

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses.

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT – II **Cataloguing and Indexing, Data structure**

Cataloguing and Indexing: History and objectives of Indexing, Indexing Process, Automatic Indexing, Information extraction.

Data structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT – III **Automatic Indexing, Document and Term Clustering**

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages.

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Manual Clustering Automatic Term Clustering, Complete Term Relation Method, Clustering Using Existing Clusters, One Pass Assignments, Item Clustering, hierarchy of Clusters.

UNIT – IV **Automatic Indexing, Information visualization**

Automatic Indexing: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext.

Information visualization: Introduction to Information visualization, Cognition and perception, Information Visualization Technologies.

UNIT – V **Text Search Algorithms, Multimedia Information Retrieval, Information System Evaluation**

Text Search Algorithms: Introduction to Text Search techniques, software Text Search algorithms, Hardware Text Search Systems.

Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph retrieval, Imagery Retrieval, Video Retrieval.

Information System Evaluation: Introduction to Information System Evaluation, Measures Used in System Evaluation, Measurement Example- TREC results.

4.Textbooks:

1. Information Storage and Retrieval Systems: Theory and Implementation by Gerald J. Kowalski, Mark T. Maybury, Springer, 2013.

Reference Books:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrieval by Yates Pearson Education. 3. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.

Online Learning Resources:

1. Information Retrieval Systems - an overview | Science Direct Topics
2. Information Retrieval (tutorialandexample.com)

COURSE STRUCTURE
A33133 – REINFORCEMENT LEARNING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with Knowledge on fundamentals of reinforcement learning and the methods used to create agents that can solve a variety of complex tasks

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A33133.1 Understand basics of RL.

A33133.2 Understand RL Framework and Markov Decision Process.

A33133.3 analyzing through the use of Dynamic Programming and Monte Carlo.

A33133.4 Understand TD (0) algorithm, TD (λ) algorithm.

3. Course Syllabus

UNIT-I

Basics of probability and linear algebra, Definition of a stochastic multi-armed bandit, Definition of regret, achieving sub linear regret, UCB algorithm, KL-UCB, Thompson Sampling.

UNIT-II

Markov Decision Problem, policy, and value function, Reward models (infinite discounted, total, finite horizon, and average), Episodic & continuing tasks, Bellman's optimality operator, and Value iteration & policy iteration

UNIT-III

The Reinforcement Learning problem, prediction and control problems, Model-based algorithm, Monte Carlo methods for prediction, and Online implementation of Monte Carlo policy evaluation

UNIT-IV

Bootstrapping; TD (0) algorithm: Convergence of Monte Carlo and batch TD (0) algorithms; Model-free control: Q-learning, Sarsa, Expected Sarsa.

UNIT-V

N-step returns; TD (λ) algorithm: Need for generalization in practice; Linear function approximation and geometric view; Linear TD (λ). Tile coding; Control with function approximation; Policy search; Policy gradient methods; Experience replay; Fitted Q Iteration; Case studies.

4. Textbooks:

Text Book(s)

1. “Reinforcement learning: An introduction,” First Edition, Sutton, Richard S., and Andrew G. Barto, MIT press 2020.

2. “Statistical reinforcement learning: modern machine learning approaches,” First Edition, Sugiyama, Masashi. CRC Press 2015.

References:

1. “Bandit algorithms,” First Edition, Lattimore, T. and C. Szepesvári. Cambridge University Press. 2020.

2. “Reinforcement Learning Algorithms: Analysis and Applications,” Boris Belousov, Hany Abdulsamad, Pascal Klink, Simone Parisi, and Jan Peters First Edition, Springer 2021.

3. Alexander Zai and Brandon Brown “Deep Reinforcement Learning in Action,” First Edition, Manning Publications 2020.

COURSE STRUCTURE

A33134– INTRODUCTION TO CYBER SECURITY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

Cyber security involves everyone and every entity — from you and your neighbours to organizations and companies to governments. It's considered a fundamental necessity, and in this introduction to cyber security course, you'll learn how to protect yourself and others from online attacks. This is a great starting point for anyone interested in learning cyber security.

2. Course Outcomes:

After completion of the course, the learner will be able to:

A33134.1 Analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

A33134.2 Interpret and forensically investigate security incidents

A33134.3 Apply policies and procedures to manage Privacy issues

A33134.4 Design and develop secure software modules

3. Course Syllabus:

UNIT -I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, Then Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service

Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc Cyber crime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

2. B.B. Gupta, D.P.Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.

2. Introduction to Cyber Security, Chwan-Hwa (john) Wu,J. David Irwin, CRC PressT & FGroup

COURSE STRUCTURE
A33135 – UNIFIED MODELING LANGUAGE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description:

Object-oriented analysis and design (OOAD) is a technical approach for analyzing, designing a system by applying the object-orientated concepts, and develops a set of graphical system models during the development life cycle of the software. OOAD in modern software engineering is typically conducted in an iterative and incremental way. In this course, the students will learn how to produce detailed object models and designs from system requirements; use the modelling concepts provided by UML; identify use cases and expand into full Behavioural designs; expand the analysis into a design ready for implementation and construct designs that are reliable.

2. Course Outcomes:

After completion of the course, the learner will be able to:

A33135.1 Recognize the concepts and principles of object-oriented programming concepts.

A33135.2 Understand the purposes, major components and key mechanisms of Class and Object Diagram.

A33135.3 Describe the basic resource management responsibilities of Interaction Diagram.

A33135.4 Construct State-chart Diagram for the given application.

A33135.5 applying the techniques for Component and Deployment Diagrams.

3. Course Syllabus

Unit – I

Introduction to UML: Importance of modelling, principles of modelling, object oriented Modelling, conceptual model of the UML, Architecture, Software Development Life Cycle. Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.

Unit – II

Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams. Design class diagram for Library information system.

Unit – III

Basic Behavioural Modelling-I: Interactions, Interaction diagrams. Basic Behavioural Modelling-II: Use cases, Use case Diagrams, Activity Diagrams. Design Use cases, Use case diagrams, Interaction diagram and Activity diagram for library system.

Unit – IV

Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Design State machine for different objects in library system.

Unit – V

Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams. Design and document of library system.

4. Text Books & Other References

Text Books

1. GradyBooch, James Rumbaugh, Ivar Jacobson: The Unified Modelling Language User Guide, Pearson Education, 2008

Suggested / Reference Books

1. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dramatic India Pvt. Ltd, 2012

2. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education, 2000

3. Pascal Roques: Modelling Software Systems Using UML2, WILEY-Dramatic India Pvt. Ltd., 2011

4. AtulKahate: Object Oriented Analysis & Design, the McGraw-Hill Companies, 2007

Other Resources

1. www.uml-diagrams.org/uml-object-oriented-concepts.html

2. https://onlinecourses.nptel.ac.in/noc16_cs19

3. http://engineeringvideolectures.com/video/1237

COURSE STRUCTURE
A33136 – FUNDAMENTALS OF DATA ANALYTICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

In this course, students will gain the basic understanding of the emerging Data Analytics field. The students will be required to work with real-world examples using current computing tools. Integral to the course is a group project where students will complete a variety of tasks including: requirement elicitation; developing hypothesis; data exploration; dimensional analysis; identifying metrics; and visual presentation of result

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

Upon successful completion of this subject students should be able to:

A33136.1 Identify skills and attributes required for the understanding and application of data analytics in Industry

A33136.2 Describe the methods involved in data analytics, their scope and limitations.

A33136.3 Design a data analytics project in a business environment.

A33136.4 Apply data analytics methods for descriptive and predictive analytics tasks in a business environment

3. Course Syllabus

UNIT-I

INTRODUCTION Overview of Data: Definition - Types of data – Quantitative and Qualitative (Nominal, Ordinal, Discrete and Continuous) Big Data: Structured, Unstructured and semi-structured - Metadata: Concepts of metadata – Types of metadata – Uses Data Source: Enterprise Data Source, Social Media Data Source, Public Data Source – Web Scrapping- Basic Concepts of Data Warehouse and Data Mining – Distributed File System.

UNIT-II

DATA PROCESS OVERVIEW Defining Goals- Data Acquisition – Sources of acquiring the data - Data pre-processing- Imputation of Missing values - Data cleaning - Data Reduction, Data Transformation and Data Discretization. Exploratory Data Analysis (EDA) – Philosophy of EDA -

The Data Science Process. Significance of EDA in data science - Basic tools (plots, graphs and summary statistics) of EDA

UNIT-III

Stack, operations on stack, Applications of stack, Queue, circular queue, priority queue, Applications of Queue, linked list, introduction to trees, Graph representation, data organization models, Centre of excellence.

UNIT-IV

DATA ANALYSIS &VISUALIZATION Spreadsheets: Data Manipulations- Sort, filter, remove duplicates-text and math functions-pivot table-lookup functions-Data visualizations for quantitative and qualitative data- charts-Excel Modelling- forecast models using advanced lookup and data validation tools. Tableau: Creating Visualizations in Tableau-Data hierarchies, filters, groups, sets, calculated fields-Map based visualizations-Build interactive dashboards-Data Stories.

UNIT-V

ETHICS AND RECENT TRENDS Data and Business Insights- Data Science Engineering: - Need of Data Science - Ethics – Doing good data science – Natural Language Processing – Machine Learning Model- Valuing Data privacy – Getting informed consent - The Five Cs – Diversity – Inclusion – Future Trend

4. Books and Materials

Text Book(s)

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, and AnujKarpatne (2019). Introduction to Data Mining, Global Edition, 2nd edition, Pearson Higher Education. Available online in UTS library. Https://www.knime.com/
2. Wes McKinney (2022). Python for Data Analysis 3e - Data Wrangling with pandas, NumPy, and Jupiter, O'Reilly Media, Inc, USA. This is a practical textbook with comprehensive code projects in github: https://github.com/wesm/pydata-book.
3. Graham Williams (2011). Data Mining with Rattle and R, Springer. This is a nice simple introduction to data mining using the R statistical language and Rattle, a package that sits on top of it.
4. Margaret H. Dunham (2002). Data Mining:
5. Han, J., Kamber, M., and Pei, J (2012). Data Mining:

6. Pyle, D. (1999). Data preparation for data mining, San Francisco, Calif.: Morgan Kaufmann Publishers. A key book on data pre-processing Bramer, M (2020). Principles of Data Mining, 4th edition.
7. Witten, I. H., Frank, E. Hall, M, and Pal, C (2017). Data Mining: Practical Machine Learning Tools and Techniques forth edition, Morgan Kaufmann. The book is a light broad view of data mining. The book complements the WEKA toolkit used in the class

References:

1. The UTS Coursework Assessment Policy & Procedure Manual, at www.gsu.uts.edu.au/policies/coursewkassess.html

Other Resources:

1. Subject announcements, the topic discussion boards for the subject and other communication tools will be in UTS Canvas: https://canvas.uts.edu.au/

COURSE STRUCTURE

A33137 – RECOMMENDER SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Overview

This specialisation on Recommender Systems covers the most important of recommendation algorithms, including content-based and collaborative filtering, dimensionality reduction, hybrid techniques, cross-domain and context-aware techniques.

2. Course Outcomes

A33137.1 To understand basic techniques and problems in the field of recommender systems

A33137.2 Evaluate Types of recommender systems: non-personalized, content based, collaborative filtering.

A33137.3 Apply algorithms and techniques to develop Recommender Systems that are widely used in the Internet industry.

A33137.4 To develop state-of-the-art recommender systems

3. Course Syllabus

UNIT - I

An Introduction to Recommender Systems, Neighbourhood -Based Collaborative Filtering, Goals of Recommender Systems, Basic Models of Recommender Systems, Domain-Specific Challenges in Recommender Systems. Advanced Topics and Applications. Introduction, Key Properties of Ratings Matrices, Predicting Ratings with Neighbourhood-Neighbourhood-Based Collaborative Filtering: Based Methods, Clustering and Neighbourhood-Based Methods, Dimensionality Reduction and Neighbourhood Methods, Graph Models for Neighbourhood-Based Methods, A Regression Modelling View of Neighbourhood Methods

UNIT - II

Model-Based Collaborative Filtering, Content-Based Recommender Systems, Decision and Regression Trees, Rule-Based Collaborative Filtering, Naive Bayes Collaborative Filtering, Using an Arbitrary Classification Model as a Black-Box, Latent Factor Models, Integrating Factorization and Neighbourhood Models.

Content-Based Recommender Systems:

Introduction, Basic Components of Content-Based Systems, reprocessing and Feature Extraction, Learning User Profiles and Filtering, Content-Based Versus Collaborative Recommendations, Using Content-Based Models for Collaborative Filtering, Summary.

UNIT – III

Knowledge-Based Recommender Systems, Ensemble-Based and Hybrid Recommender Systems, Constraint-Based Recommender Systems, Case-Based Recommenders, Persistent Personalization in Knowledge-Based Systems, Summary. Ensemble Methods from the Classification Perspective, Weighted Hybrids, Switching Hybrids, Cascade Hybrids, Feature Augmentation Hybrids, Meta-Level Hybrids, Feature Combination Hybrids, Summary.

UNIT - IV

Evaluating Recommender Systems, Context-Sensitive Recommender Systems, Evaluation Paradigms, General Goals of Evaluation Design, Design Issues in Offline Recommender Evaluation, Accuracy Metrics in Offline Evaluation, Limitations of Evaluation Measures, Limitations of Evaluation Measures. The Multidimensional Approach, Contextual Pre-filtering: A Reduction-Based Approach, Contextual Pre-filtering: A Reduction-Based Approach, Contextual Modelling.

UNIT – V

Time- and Location-Sensitive Recommender Systems, Temporal Collaborative Filtering, Discrete Temporal Models, Location-Aware Recommender Systems, Location-Aware Recommender Systems Location-Aware Recommender Systems, Summary.

4. Books and Materials

Textbooks:

1. Charu C. Aggarwal, “Recommender Systems”, Springer, 2016.

5. Reference Books:

1. Francesco Ricci, LiorRokach, “Recommender Systems Handbook”, 2nd ed., Springer, 2015 Edition

6. Online Learning Resources:

1. Recommendation System -Understanding the Basic Concepts (analyticsvidhya.com)
2. Recommender Systems | Coursera

COURSE STRUCTURE
A33138 – AUTONOMOUS SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

The course is aimed at learning basic and advanced techniques necessary for the sensing and control of autonomous systems. Contents covered in this course are the theory and application of topics such as Stochastic Processes, Bayesian State Estimation (including Kalman Filter), Sensor Data Fusion, Fuzzy Logic, Particle Swarm Optimization (PSO), Genetic Algorithms.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A33138.1 Understanding of the general theory of Bayesian Estimation.

A33138.2 Understanding of the theory and application of the Kalman Filter (KF and EKF) for solving diverse.

A33138.3 Understanding of methods such as GA, Fuzzy Logic.

A33138.4 Develop software for applying the theory and actually solving complex problem.

A33138.5 Get experience in using state of the art sensors, used in Field Robotics and Autonomous Systems

3. Course Syllabus

UNIT-I

Refreshing concepts: Statistics (Random variables, probability density functions), state space representation, matrix/vector operations and Matlab programming language

UNIT-II

Sensors used in the projects: Inertial Measurement Unit (IMU). Laser Scanner. Other usual sensors used in Mobile Robotics. Process Models for mobile platforms

UNIT-III

Study of Bayesian Estimation, Sensor Data Fusion, Gaussian Estimators: Kalman Filter and Extended Kalman Filter (EKF), Examples using EKF for estimation (not just for Robotics).

UNIT-IV

Applying EKF in Robotics: Solving the localization of the UGV Alternative approach: Applying an optimizer for solving the localization problem,

UNIT-V

Case of Study: SLAM (Simultaneous Localization and Mapping), Introduction to PSO (Particle Swarm Optimization), Introduction to Genetic Algorithms, Introduction to Fuzzy Logic

4. Textbooks:

1. Intelligent Autonomous Systems by Kakazu.Y, Wada.M, and Sato.T, IOS Press, 1998.

References:

1. https://student.unsw.edu.au/special-consideration.
2. Advances in Intelligent Autonomous Systems by S. G. Tzafestas, Springer, 1999

COURSE STRUCTURE
A33139 – CLOUD COMPUTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides the students with knowledge of computer model called cloud computing, various levels of services that can be achieved by cloud, security aspects in cloud.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A33139.1 Ability to create cloud computing environment

A33139.2 Ability to design applications for Cloud environment

A33139.3 Design and develop backup strategies for cloud database don features.

A33139.4 Use and Examine different cloud computing services.

A33139.5 Apply different cloud programming models per need

3. Course Syllabus

UNIT – I

Introduction to cloud computing: Introduction, Characteristics of cloud computing, Cloud Models, Cloud Services Examples, Cloud Based services and applications. **Cloud concepts and Technologies:** Virtualization, Load balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined, Network function virtualization, Map Reduce, Identity and Access Management, services level Agreements, Billing. **Cloud Services and Platforms:** Compute Services, Storage Services, Database Services, Application services, Content delivery services, Analytics Services, Deployment and Management Services, Identity and Access Management services, Open Source Private Cloud software.

UNIT - II

Hadoop Map Reduce: Apache Hadoop, Hadoop Map Reduce Job Execution, Hadoop Schedulers, Hadoop Cluster setup. **Cloud Application Design:** Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches. **Python Basics:** Introduction, Installing Python, Python data Types &amp, Data Structures, Control flow, Function, Modules, Packages, File handling, Date/Time Operations, Classes.

UNIT – III

Python for Cloud: Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for Map Reduce, Python packages of Interest, Python web Application Frame work, Designing a Restful web API. **Cloud Application Development in Python:** Design Approaches, Image Processing APP, Document Storage App, and Map Reduce App, Social Media Analytics App.

UNIT – IV:

Big Data Analytics: Introduction, Clustering Big Data, Classification of Big data Recommendation of Systems. **Multimedia Cloud:** Introduction, Case Study: Live video Streaming App, Streaming Protocols, case Study: Video Transcoding App. **Cloud Application Benchmarking and Tuning:** Introduction, Workload Characteristics, Application Performance Metrics, Design Considerations for a Benchmarking Methodology, Benchmarking Tools, Deployment Prototyping, Load Testing & Bottleneck Detection case Study,Hadoop benchmarking case Study.

UNIT - V

Cloud Security: Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity Access Management, Data Security, Key Management, Auditing. **Cloud for Industry, Healthcare &Education:** Cloud Computing for Healthcare, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education. **Migrating into a Cloud:** Introduction, Broad Approaches to migrating into the cloud, the seven– step model of migration into a cloud. **Organizational readiness and Change Management in The Cloud Age:** Introduction, Basic concepts of Organizational Readiness, Drivers for changes: A frame work to comprehend the competitive environment, common change management models, change management maturity models, Organizational readiness self – assessment. **Legal Issues in Cloud Computing:** Introduction, Data Privacy and security Issues, cloud contracting models, Jurisdictional issues raised by virtualization and data location, commercial and business considerations, Special Topics.

4. Books and Materials

Textbooks:

1. Cloud computing a hands-on Approach‖ By ArshdeepBahga, Vijay Madisetti, Universities Press, 2016
2. Cloud Computing Principles and Paradigms: By Raj Kumar Buyya, James Broberg, Andrzej Goscinski, Wiley, 2016

Reference Books:

1. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, SThamaraiSelvi, TMH
2. Cloud computing A Hands-On Approach by ArshdeepBahga and Vijay Madisetti.
3. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Tata McGraw Hill, 2011.
4. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
5. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O 'Reilly, SPD, rp2011.
6. Essentials of Cloud Computing by K. Chandrasekaran. CRC Press.

Online Learning Resources: Cloud computing - Course (nptel.ac.in)

COURSE STRUCTURE
A33140 - FUNDAMENTALS OF DATA CENTERS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Data center is a physical facility that organizations use to house their critical applications and data. A data center's design is based on a network of computing and storage resources that enable the delivery of shared applications and data. In addition to the key considerations, there are three important design criteria to keep in mind throughout the design of your new data centre. These principles are flexibility, scalability, and reliability of your data centre. In order to perform Data Center at its best, achieving the right temperature in the environment is an important factor and cannot be excluded from its main characteristics. The key is cooling, avoiding high temperatures, keeping optimal air conditioning standards, as well as controlling humidity levels.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A33140.1 Explain the basic concepts of data center and its components.

A33140.2 Describe data center designs.

A33140.3 Compare different types of server farms.

A33140.4 Discuss data center construct and back-up/recovery technologies.

3. Course Syllabus

UNIT – I

Overview of Data Centers: Data Centers Defined, Data Center Goals, Data Center Facilities, Roles of Data Centers in the Enterprise, Roles of Data Centers in the Service Provider Environment, , Application Architecture Models. The Client/Server Model and Its Evolution, the n-Tier Model, Multitier Architecture Application Environment, Data Center Architecture.

UNIT - II

Data Centre Requirements: Data Center Prerequisites, Required Physical Area for Equipment and Unoccupied Space, Required Power to Run All the Devices, Required Cooling and HVAC, Required Weight, Required Network Bandwidth, Budget Constraints, Selecting a Geographic Location, Safe

from Natural Hazards, Safe from Man-Made Disasters, Availability of Local Technical Talent, Abundant and Inexpensive Utilities Such as Power and Water, Selecting an Existing Building (Retrofitting), tier standard

UNIT – III

Data Centre Design : Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wire ways, Cable Trays, Design and Plan against Vandalism,

UNIT – IV:

Introduction to Server Farms: Types of server farms and data centre, internet server farm, intranet server farm, extranet server farm, internet data center, corporate data center, software defined data center, data center topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, Data Center Transport Layer, Data Center Services, IP Infrastructure Services, Application Services, Security Services, Storage Services.

UNIT - V

Business Continuity and Disaster Recovery fundamentals : Business continuance infrastructure services, the need for redundancy,, Information availability , BC terminology , BC planning life cycle , BC technology solutions , backup and recovery considerations , backup technologies , Uses of local replicas , Local replication technologies , Restore and restart considerations , Modes of remote replications , remote replication technologies .

4. Books and Materials

Textbooks:

1. Data Center Fundamentals by Mauricio Arregoces, CISCO Press

2. Administering Data-Centers, KailashJayswal, Wiley

Reference Books:

1. Data Center for Beginners: A beginner's guide towards understanding Data Center Design (Data Center Design Guide) Kindle Edition by B.A. Ayomaya.
2. The Data Center Builder's Bible - Book 1: Defining Your Data Center Requirements: Specifying, Designing, Building and Migrating to New Data Centers Kindle Edition by Art Carapola

COURSE STRUCTURE
A33141 – BLOCK CHAIN TECHNOLOGY AND APPLICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is intended to study the foundations of Block chain technology. In this course, the student will explore various aspects of Block chain technology. By implementing, the student will have an idea about private and public block chain, and intelligent contract. The student should have an idea to design and deploying the smart contracts.

Course Pre/co requisites

Cryptography and Network Security

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A33141.1 Understand and explore the process of Block chain technology.

A33141.2 Analyze the working of Smart Contracts

A33141.3 Perform basic operations in hyper ledges and block chain networks.

A33141.4 Describe and deploy the smart contracts.

A33141.5 Identify the risks involved in building Block chain applications.

3. Course Syllabus

UNIT I

Introduction, Scenarios, Challenges Articulated, Block chain, Blockchain Characteristics, Opportunities Using Blockchain, History of Block chain. Evolution of Blockchain: Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Blockchain Evolution, Consortia, Forks, Public Blockchain Environments, Type of Players in Blockchain Ecosystem, Players in Market.

UNIT II

Blockchain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on block chain, data storage on block chain,

wallets, coding on block chain: smart contracts, peer-to-peer network, types of block chain nodes, risk associated with block chain solutions.

UNIT III

Architecting Blockchain solutions: Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference Architecture, Types of Blockchain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Blockchain Solutions, Architecture Considerations..

UNIT IV

Ethereum Blockchain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Eco-system, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment.

UNIT V

Hyperledger Blockchain Implementation: Introduction, Use Case Car Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, and FabCar Use Case Implementation, Invoking Chaincode Functions Using Client Application.

4. Books and Materials

Text Book (s)

1. Ambadas, Arshad SarfazAriff, Sham “Block chain for Enterprise Application Developers”, Wiley publications.

2. Andreas M. Antonpoulos, “MasteringBitcoin: Programming the Open Blockchain”, O'Reilly 2ndedition 2017

Reference Book(s)

1 Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill

COURSE STRUCTURE
A33142 – AI FOR IMAGE ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

This course is intended to study the formats of images. By implementing APIs of python related to image processing. The student should have an idea to design and deploying the smart contracts.

2. Course Outcomes (COs)

After completion of the course, students will be able to

A33142.1 Understand the format of different type of images

A33142.2 Apply the functionality of python for image processing

A33142.3 Relate machine learning and image processing

3. Course Syllabus

UNIT - 1 **Image Formation& 3-D Imaging**

Introduction to Image Formation:

Introduction, World and camera coordinates, Ideal Imaging: Perspective Projection, Real Imaging, Radiometry of Imaging, Liner System Theory of Imaging, Homogeneous Coordinates

Introduction to 3-D Imaging: Basics, Depth from Triangulation, Depth from Time-of-Flight, and Depth from Phase: Interferometer, Shape from Shading, And Depth from Multiple Projections: Tomography

UNIT-2 Image Processing

Introduction to Image Processing:

Images, Pixels, Image Resolution, PPI and DPI, Bitmap Images, Lossless Compression, Lossy Compression, Image File Formats, Color Spaces: RGB, XYZ, HSV/HSL, LAB, LCH, YPbPr, YUV, YIQ.

UNIT-3 **Basics of Python & Scikit Image**

Basics of Python:

Variables and Data Types, Data Structures, Control Flow Statements, Conditional Statements, Functions

Scikit Image:

Uploading and Viewing an Image, Getting Image Resolution, Looking at Pixel Values, Converting Color Space, Saving an Image, Creating Basic Drawings, Doing Gamma Correction. Rotating, Shifting,

and Scaling Images, Determining Structural Similarity.

UNIT – 4 Advanced Image Processing Using Open CV

Blending Two Images, Changing Contrast and Brightness, Adding Text to Images, Smoothing Images: Median Filter, Gaussian Filter, Bilateral Filter. Changing the Shape of Images, Effecting Image Thresholding, Calculating Gradients, Performing Histogram Equalization.

UNIT -5 Image Processing Using Machine Learning & Real-Time Use Cases

Feature Mapping Using the SIFT Algorithm, Image Registration Using the RANSAC Algorithm: estimate affine, residual lengths, processing the Images, the complete code. Image Classification Using Artificial Neural Networks, Image Classification Using CNNs, Image Classification Using Machine Learning Approaches: Decision Trees, Support Vector Machines, Logistics Regression, Code, Important Terms

TEXTBOOKS:

1. Digital Image Processing by **Rafael C. Gonzalez,4th Edition, 2018**
2. Hands-On Image Processing with Python: Expert techniques for advanced image analysis and effective interpretation of image data, by Sandipan Dey, 2018

Reference Books:

1. Digital Image Processing-Bernd Jahne,2005

Online Learning Resources:

1. How to Implement Artificial Intelligence for Solving Image Processing Tasks | Apriorit
2. Image Processing for Engineering and Science | Coursera

COURSE STRUCTURE

A33143- FULL STACK SOFTWARE DEVELOPMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of web development technologies, Idea for creating two tier and three tier architectural web applications, real time web applications, Constructing suitable client and server side applications, To learn core concept of both front end and back end programming.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A33143.1 Develop a fully functioning website and deploy on a web server.

A33143.2 Gain Knowledge about the front end and back end Tools

A33143.3 Find and use code packages based on their documentation to produce working results in a project.

A33143.4 Create web pages that function using external data.

A33143.5 Implementation of web application employing efficient database access.

3. Course Syllabus

UNIT - I

Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git & Github HTML, CSS

UNIT - II

Frontend Development: JavaScript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format.

UNIT - III

REACT JS: Introduction to React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication

UNIT - IV

Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring Restful API using Spring Framework Building an application using Maven

UNIT - V

Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles and deploying application in Cloud

4. Books and Materials

Text Books:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas

2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by- Step Guide to Creating Dynamic Websites by Robin Nixon

3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BYAZAT MARDAN

Reference Books:

1. Full-Stack JavaScript Development by Eric Bush.

2. Mastering Full Stack React Web Development Paperback – April 28, 2017 by TomaszDyl, KamilPrzeorski, MaciejCzarnecki

COURSE STRUCTURE
A33144 – COMPUTER VISION LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	14	0	28	2	40	60	100

1. Course Description

Course Overview

This Laboratory course provides the students with knowledge of operations in Image processing and Computer Vision. Includes topics like Erosion, Dilation, Smoothening and Sharpening in both spatial and Frequency domain.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A33144.1 Develop Image processing techniques like Erosion and Dilation of an Image

A33144.2 Apply Operations in Spatial Domain like Smoothing and Sharpening

A33144.3 Implement Operations in frequency Domain.

A33144.4 Convert one color space to other color spaces

A33144.5 Implement OpenCV library efficiently.

3. Course Syllabus

List of Image Processing and Computer Vision Techniques

1. Reading a color image and subtracting a square from that image.
2. Erosion of an Image in grayscale
3. Dilation of an image in grayscale
4. Smoothing of an image in Spatial Domain
5. Sharpening of an image in Spatial Domain
6. Smoothing of an image in Frequency Domain
7. Sharpening of an image in Frequency Domain
8. Use of colour spaces and its conversions

4. Textbooks:

Textbooks:

1. Computer Vision: Algorithms and Applications, 2010.
2. Computer Vision: Models, Learning, and Inference, 2012.

Reference Books:

1. Computer Vision: A Modern Approach, 2002.
2. Multiple View Geometry in Computer Vision, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30081 – RESEARCH METHODOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of this course is to have a general understanding of statistics as applicable to business and its use in areas of engineering research. The Course addresses the methods of research with an emphasis on various stages that are necessary to obtain and process information to enable well informed decision-making. It allows the students to grasp and comprehend the methods and techniques used in research and provide with the knowledge and skill to undertake research.

Course Pre/Corequisites

The course has no specific prerequisite and Corequisites

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30081.1 Interpret the importance of literature survey to identify the research problem.
A30081.2 Develop suitable research methodologies to conduct engineering research.
A30081.3 Apply the principles of research to gather the required data from various sources.
A30081.4 Evaluate the gathered data by using appropriate statistical techniques.
A30081.5 Prepare and present the research report effectively with the help of visual aids.

3. Course Syllabus

UNIT-I

Research Methodology: Objectives and motivation of research, types of research, research approaches, significance of research, research methods verses methodology, research and scientific method, important of research methodology, research process, criteria of good research, problems encountered by researchers in India, benefits to the society in general, defining the research problem: definition of research problem, problem formulation, necessity of defining the problem, technique involved in defining a problem.

UNIT-II

Literature Survey: Importance of literature survey, sources of information, assessment of quality of journals and articles, information through internet. Literature review: need of review, guidelines for review, record of research review.

UNIT-III

Research Design: Meaning of research design, need of research design, feature of a good design important concepts related to research design, different research designs, basic principles of experimental design, developing a research plan, design of experimental set-up, use of standards and codes.

UNIT-IV

Data Collection: Collection of primary data, secondary data, data organization, methods of data grouping, diagrammatic representation of data, graphic representation of data. Sample designed for sampling, some important sampling definitions, estimation of population, role of statistics for data analysis, parametric v/s non-parametric methods, and descriptive statistics, measures of central tendency and

dispersion, hypothesis testing, use of statistical software. Data analysis: deterministic and random data, uncertainty analysis, tests for significance: chi-square, student's t-test, regression modelling, direct and interaction effects, a nova, F-test, time series analysis, autocorrelation and autoregressive modelling.

UNIT-V

Research Report Writing: Format of the research report, synopsis, dissertation, and thesis its differentiation, references/bibliography/webliography, technical paper writing/journal report writing, making presentation, use of visual aids. Research proposal preparation: writing a research proposal and research report, writing research grant proposal.

4. Books and Materials

Text Book(s)

1. O.R Krishnaswami and M. Ranganatham, Methodology of Research in Social Sciences, Mumbai: Himalaya Publishing House, ISBN 81-8318-454-5, 2005.

Reference Book(s)

1. C.R Kothari, Research Methodology, Methods & Technique; Hyderabad: New Age International Publishers, 2004.
2. R. Ganesan, Research Methodology for Engineers, New Delhi: MJP Publishers, 2011.
3. Ratan Khananabis and SuvasisSabha, Research Methodology, Universities Press, Hyderabad, 2015.
4. Y. P. Agarwal, Statistical Methods: Concepts, Application and Computation, Sterling Publications Pvt., Ltd., New Delhi, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30087 – ENTREPRENEURSHIP DEVELOPMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of this course is to provide common knowledge on the basics of entrepreneurship, risk and reward. Further, the course addresses on promotion and institutional support by various institutions, ways and means of project planning, feasibility studies, project proposal and report preparation and, also the role of angel investors in promotion and expansion of start-ups in India. It also encourages the student to take up local challenges and establish startups. Hence, students will be able to transform himself/herself from a job seeker to provider.

Course Pre/Corequisites

The course has no specific prerequisite and Corequisites

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30087.1 Understand the foundation knowledge about entrepreneurship and importance of innovation and IPR in Entrepreneurship

A30087.2 Aware about the important stakeholders in entrepreneurship support ecosystem and Govt. initiatives related to Entrepreneurship

A30087.3 Develop the Business Plan Proposals and assess the business ideas

A30087.4 Identify the suitable sector for starting entrepreneurial venture as per their competencies

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3. Course Syllabus

UNIT-I

Introduction to Entrepreneurship: Entrepreneurship – Definitions, Evolution and Concept of Entrepreneur, Scope of Entrepreneurship, Entrepreneurial Characteristics and Skills, Types of Entrepreneurs, Distinction between Entrepreneur and Manager, Functions of an Entrepreneur, Success Factors for Entrepreneurs

UNIT-II

Innovation and IPR for Entrepreneurship: Creativity and Invention, Innovation – Definitions, Types of Innovation, Design Thinking, Elements in the Innovation Process, Barriers for Innovation, IPR – Meaning and Definitions, Importance of IPR, Types of IPR – Patents, Copyrights, Trademarks, Trade Secrets, Geographical Indications

UNIT-III

Entrepreneurial Support Ecosystem: Business Incubators, Accelerators, Venture Capitalists, Angel Investors, Impact Investors, Government Schemes and Programs for Entrepreneurship Development – Startup India & Standup India, Atal Innovation Mission, DST – NIDHI, DBT – BIRAC, Pradhan Mantri Mudhra Yojna, MSME Schemes

UNIT-IV

Planning for Entrepreneurial Venture: Business Plan – Meaning and Definition, Uses of Business Plan, Writing a Business Plan, Entrepreneurial Marketing, Advertising, Branding, Financing, Legal Structures for Startup Registration, Business Model Canvas, Ethical Considerations in Entrepreneurship, Challenges of Entrepreneurs

UNIT-V

Sectoral Opportunities in Entrepreneurship: Technology Entrepreneurship, Social Entrepreneurship, Agriculture Entrepreneurship, Women Entrepreneurship, Rural Entrepreneurship, Eco-Entrepreneurship, Tourism Entrepreneurship & Case studies

4. Books and Materials

Text Books:

1. Rajeev Roy, Entrepreneurship, Second Edition, Oxford University Press, New Delhi, 2011
2. Dr. S.S. Khanka, Entrepreneurial Development, S. Chand & Company Ltd., New Delhi, 2010
3. David H. Holt, Entrepreneurship New Venture Creation, PHI Learning Private Limited, New Delhi, 2010

Reference Books:

1. Bruce R. Barringer & R. Duane Ireland, Entrepreneurship: Successfully Launching New Ventures, Pearson, New Delhi, 2006
2. Vasanth Desai, The Dynamics of Entrepreneurial Development and Management, Sixth Edition, Himalaya Publishing House, New Delhi, 2011

Online Learning Resources:

1. NPTEL: Entrepreneurship by Prof. C Bhaktavatsala Rao, IIT Madras
2. SWYAM: Entrepreneurship Development by Dr. Nilam Panchal, B.K. School of Professional and Management Studies, Gujrat University
3. Future Learn: Entrepreneurship: From Business Idea to Action by King's College, London

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30022 - PROFESSIONAL ETHICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	40	60	100

1. Course Description

Course Overview

Ethical and professional values course provides a framework and a moral compass for students and help guide their professional behaviors. This course broadens ethical and professional values which underpin professional skills and behaviors. The students work efficiently by prioritizing, organizing and managing their time effectively. They make the best use of technology, including spreadsheets and data analytics, to find effective solutions to various issues by considering the importance of maintaining professional competence and pursuing life-long learning. This course also introduces them to communicate effectively in academics and in profession. The students become aware of the working structure of the society by identifying opportunities, problems and observe trends and make suitable recommendations based on them. The students explore different types of leadership approaches and qualities of effective leaderswhich can be adopted or adapted at any level. This course provides the students with those skills that encourage them to become open-minded and involve in innovative thinking.

Course Pre/co requisites

A30035 – Universal Human Values- understanding harmony

2. Course Outcomes (COs)

After completion of the course, the learner will be able:

A30022.1 to identify ethical dilemmas and take ethical decisions.

A30022.2 to consider the importance of maintaining professional competence and pursuing life-long learning

A30022.3 to understand patterns and channels of communication and their efficiency.

A30022.4 to analyze and evaluate available data and information from a variety of sources.

A30022.5 to demonstrate leadership qualities in teams effectively and efficiently.

A30022.6 the importance of applying an enquiring mind when collecting and assessing data and information.

3. Course Syllabus

UNIT I ETHICS AND PROFESSIONALISM

Introduction, perspectives of Ethics, branches of Ethics, justice vs care, Ethics and morality, Ethics and religion, Ethics and maturity, Ethics and the professions, Rules vs principles, Ethical dilemma.

UNIT II PERSONAL EFFECTIVENESS

Prioritising, organising and managing time effectively, Using technology effectively- Using email effectively How to manage email, Maintaining professional competence and lifelong learning- Continuing professionaldevelopment, Personal development plan, How to craft your V for the job of your dreams, Tips to prepare for an interview, The interview, Getting it wrong, Getting it right

UNIT III COMMUNICATION AND INTERPERSONAL SKILLS

Introduction, The communication process- What can go wrong?, Barriers and distortions to the communications process, How good are you at communicating? Formal and informal communication, Six elements of effective communication, Communicating in the workplace- Errors and Solutions, Report Writing- the purpose of and the best practices in report writing. Interpersonal skills- Interpersonal skills, Personal qualities, Verbal communication Non-verbal communication

UNIT IV SOCIAL AWARENESS

How to enhance your commercialawareness, SWOT analysis, deciding when to seek the help of experts Suitability, acceptability, feasibility (SAF) model

UNIT V LEADERSHIP AND TEAM WORKING

Introduction, The nature of leadership, Situational leadership, Leadership in action, Action-centered leadership (Adair), Factors influencing leadership style, Blake and Mouton grid, Examples of outstanding leaders, Team development, Motivation, Accountability, responsibility and authority.

4. Books and Materials

Text Book(s)

1. Rizvi, M. Ashraf, *Effective Technical Communication,* Noida, McGraw-Hill Education. 2009.
2. Engineering Ethics (Includes Human Values)" by Govindarajan M

Reference Book(s)

1. Professional Ethics in Engineering" by I A Dhotre V S Bagad
2. Professional Ethics In Engineering" by Dr V Jayakumar and Lakshmi Publications
3. Engineering Ethics: Challenges and Opportunities" by W Richard Bowen

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30579 – The Joy of Computing Using Python

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

"The Joy of Computing Using Python" is an engaging introduction to programming with Python, designed for beginners. The course covers fundamental concepts such as variables, control structures, functions, and data structures in a hands-on manner. Students will learn to write and debug code while exploring practical applications in problem-solving and data manipulation. Emphasis is placed on building computational thinking and fostering creativity through interactive projects. By the end, participants will have a solid foundation in Python and the confidence to tackle more advanced programming challenges. The course combines theoretical knowledge with practical exercises to ensure a well-rounded learning experience

Course Pre/corequisites

Basic Mathematics, Computer Operation

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30579.1: Demonstrate proficiency in Python basics, including variables, loops, and conditionals for simple applications.
A30579.2: Apply abstraction and problem-solving techniques to develop applications and games using Python.
A30579.3: Implement and analyze algorithms such as recursion and sorting in practical scenarios.
A30579.4: Handle and analyze data using techniques like image processing, sentiment analysis, and natural language processing.
A30579.5: Develop interactive and automated solutions, including browser automation and calendar manipulation, using Python.

3. Course Syllabus

UNIT-I

Motivation for Computing, Welcome to Programming!! Introduction to Anaconda, Spyder IDE, Variables and Expressions: Design your own calculator, Loops and Conditionals: Hopscotch once again, Lists Crowd computing, Permutations: Jumbled Words

UNIT-II

Abstraction Everywhere: Apps in your phone, Magic Square hit, Dobble game, Counting Candies: Crowd to the rescue Birthday, Guess the movie, Dictionaries, Sorting and Searching,

UNIT-III

Substitution Cipher: What's the secret!! Sentiment, Tic tac toe: Let's play, Recursions, Snakes and Ladders: Down the memory lane. Spiral Traversing, Track the route,

UNIT-IV

Tuples, Lottery Simulation, Image Processing, Anagrams, Sentiment Analysis: Analyse your Facebook data, Natural Language Processing, six degrees of separation: Meet your favourites Image, Calculation of the Area: Don't measure.

UNIT-V

Flames, Data Compression, Browser Automation, Fun with Calendar, Page Rank: How Google Works!!

4. Books and Materials

Textbook(s)

1. **Charles R. Severance.** *Python for Everybody: Exploring Data Using Python 3.* A beginner-friendly book that explains core Python concepts like variables, loops, conditionals, and functions. It also delves into topics such as web scraping, databases, and data visualization.
2. **Allen B. Downey.** *Think Python: How to Think Like a Computer Scientist.* An introductory textbook that emphasizes problem-solving and computational thinking, aligning well with beginner-level courses in Python.

Reference Book(s)

1. **Al Sweigart.** *Automate the Boring Stuff with Python.* A highly practical reference for automating everyday tasks like file management, web scraping, and working with Excel files using Python.
2. **John Zelle.** *Python Programming: An Introduction to Computer Science.* A more computer science-oriented introduction to Python that dives into computational theory and algorithms along with Python coding.
3. **Luciano Ramalho.** *Fluent Python: Clear, Concise, and Effective Programming.* A good reference for more advanced users, focusing on writing more Pythonic and efficient code.
4. **Mark Lutz.** *Learning Python.* A comprehensive book that covers the Python language in-depth. It's a good resource for beginners and intermediate programmers who want to dive deeper into the language.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33147 - Responsible and Safe AI Systems

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. COURSE DESCRIPTION:

There has been an exponential increase in the use of platforms / technologies like ChatGPT, Gemini, Llama, Sora, DALL-E, etc. in our day-to-day lives. There Language & Vision models have changed our way of living, and way we seek & create information. This course provides students with a comprehensive understanding of the ethical, social, and safety considerations essential for developing and deploying artificial intelligence (AI) systems. Uncover the intricacies of algorithmic transparency, fairness in machine (un)learning, interpretability, consistency and many more. The course encourages critical thinking and fosters a deep appreciation for the impact of AI on individuals and communities.

PREREQUISITES: Any level of machine learning / AI course would help, it is not mandatory though
Learning outcomes.

2. COURSE OUTCOMES:

By the end of the module, students should be able to:

- Develop an appreciation for what is involved in Learning models from data
- Understand a wide variety of learning algorithms
- Understand how to evaluate models generated from data
- Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models

3. SYLLABUS

UNIT 1

AI Capabilities Improvement in last 5-10 years, imminent risks from AI Models: Toxicity, bias, goal misspecification, adversarial examples etc. Long-term risks from AI Models: Misuse, Misgeneralization, Rogue AGI, Principles of RAI - Transparency; Accountability; Safety, Robustness and Reliability, Privacy and Security; Fairness and non-discrimination; Human-Centred Values; Inclusive and Sustainable development, Interpretability

UNIT 2

Deep Learning Techniques, Language/Vision Models, AI Risks for Gen models, Adversarial Attacks – Vision, NLP, Superhuman Go agents, ML Poisoning Attacks like Trojans, Implications for current and future AI safety, Explain-ability, Imminent and Long-term potential for transparency techniques

UNIT 3

Mechanistic Interpretability, Representation Engineering, model editing and probing, Critiques of Transparency for AI Safety, Privacy & Fairness in AI, Metrics and Tools for RAI - measuring bias/fairness, adversarial testing, details of Lime/SHAP/GradCam

UNIT 4

Audit mechanisms Regulation landscape - DPDP act (India), GDPR (EU), EU AI act, US presidential declaration, Ethical approvals, informed consent, participatory design, future of work, Indian context

UNIT 5

What is AGI? When could it be achieved, Instrumental Convergence: Power Seeking, Deception etc., RAI in Legal domain, RAI in Health care domain, RAI in Education domain, A few other domains, Policy issues in RAI and Couple of panel discussion with industry practitioners, academic, government (possibly), and others.

Reference Books:

- Mitchell T, Machine Learning, McGraw-Hill, 1997
- S. Rogers and M. Girolami, A first course in Machine Learning, CRC Press, 2011
- C. Bishop, Pattern Recognition and Machine Learning, 2007
- D. Barber, Bayesian Reasoning and Machine Learning, 2012
- Duda, Hart and Stork, Pattern Classification, Wiley-Interscience.

Online Learning Resources:

https://onlinecourses.nptel.ac.in/noc24_cs132/preview

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COURSE STRUCTURE

A33148 - INTRODUCTION TO INDUSTRY 4.0 AND INDUSTRIAL INTERNET OF THINGS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

This course provides sensors and actuators in IoT and connectivity technologies like Zigbee, Bluetooth, and RFID, emphasizing network QoS and data protocols such as MQTT and CoAP. It covers Industry 4.0's history, impact, and lean production systems, along with cyber-physical systems, AI, big data, and augmented reality. Students learn about IIoT business models and opportunities, IoT/IIoT reference architectures, and fog computing's role in industrial analytics. The course also includes R programming basics and data management technologies.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

CO1. Understand various IoT connectivity technologies and their protocols.
CO2. Analyze the impact and implementation of Industry 4.0 and lean production systems.
CO3. Evaluate the role of augmented reality, virtual reality, AI, and big data in CPS.
CO4. Evaluate the feasibility and appropriateness of different business models for IIoT.
CO5. Apply fog computing architectures to industrial analytics use cases.

3. Course Syllabus

UNIT-1

Sensors – Definition, Characteristics, Classification, Actuators - Definition, Classification, IoT Connectivity Technologies – IEEE 802.15.4, Zigbee, 6LoWPAN, Wireless HART, Z-Wave, Bluetooth, NFC, RFID, IoT Network QoS, IoT Data Protocols – MQTT, CoAP, AMQP, XMPP.

UNIT-2

Introduction to Industry 4.0, Industry Revolution, the Fourth Revolution, Megatrends, LEAN Production Systems – 7 Types of wastes, overview of Impacts and Implementation of Lean, Smart and Connected Business Perspective.

UNIT-3

Cyber Physical Systems – Features, Applications, 5C Architecture, Challenges, difference with embedded systems, Collaborative Platform, Augmented Reality and Virtual Reality, Artificial Intelligence, Big Data and Advanced Analysis.

UNIT-4

Industrial Internet Systems, Business Models of IoT, Business models of IIoT, Business opportunities in IIoT, Categorization of business models in IIoT, Reference architecture of IoT, Reference Architecture of IIoT.

UNIT-5

Fog Computing in IIoT – Fog Computing Architecture for IIoT, Industrial Analytics, Use Cases, IIoT Solutions using Fog, R Programing – Variables, Operators, Data Types, Data Management – Technologies, Process, Sources, Acquisition, Storage.

4. Books and Materials

Text Book(s)

1) S. Misra, A. Mukherjee, and A. Roy, *Introduction to IoT.* Cambridge University Press, 2021 edition.
2) S. Misra, C. Roy, and A. Mukherjee, *Introduction to Industrial Internet of Things and Industry 4.0,* CRC Press,1st edition 2021

Online Learning Resources:

1) https://archive.nptel.ac.in/courses/106/105/106105195/

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COURSE STRUCTURE

A30589 - SOCIAL NETWORK ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course mainly describes about social network and semantic web which are used to learn knowledge representation using ontology and also understand human behavior in social web and related communities. covering theoretical foundations, research design, data collection techniques, methods for the analysis and visualization of network data, and statistical modelling of networks.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30589.1 To understand the concept of semantic web and related applications.

A30589.2 To learn knowledge representation using ontology.

A30589. 3 understand human behavior in social web and related communities.

A30589.4 To learn visualization of social networks.

A30589.5 To have access to a variety of descriptive measures for networks and software to

calculate them, and have the ability to interpret the results.

3. Course Syllabus

UNIT I

Introduction to colab, NetworkX - Part I: Where is the similarity, Online SocialMedia,Network MeasuresDegree Distribution, Cumulative Degree Distribution,Power lawGraph Preliminaries, Clusters in Social Network AnalysisTypes of Clusters, Connected ComponentsCentralityPageRank, Hub & AuthorityAssortative Mixing,Transitivity, Reciprocity,Measuring Structural Equivalence,Degeneracy.

Introduction to NetworkX - Part II: Rise of Online Social Networks,Synthetic Networks,Properties of Real-World Networks,Small-world PropertySynthetic Networks,Erdos-Renyi NetworksRegular Ring Laticce Network model,Watts-Strogatz Network ModelBarabasi-Albert Network ModelPrices Network Model.

UNIT II

Preferencial Attachment Model, Vertex Copying Model, Other Models-Local-World Network Growth Model, Network Model with Accelarating Growth, Short-Term Memory Preferential Attachment Mechanism ,What are links,Link Analysis,Balance Theory, Signed Networks,Interpersonel Ties, Strength of tie, Triadic Closure, Quantifying Strength, Clustering Co-efficient, Dunbar Number, Bridges,Page Rank,DivRank,SimRank, Heterogeneous Network, PathSim,Homophily in the Society,Communities in a network, Community Detection in Network, Community Structure,Types of Communities,Cut, Types of Cuts, Edge Betweenness,Community Detection.

UNIT III

Permaence and Communiuty Detection,Clique Percolation Method, Link Partition Method,BigClam,Evaluvation of Community Detection Methods,Label Propagation,Asynchronous Label Propagation, Synchronous Label Propagation, Local Community Detection,Detection Methods,Temporal changes in a network, Link Prediction-Application Areas,Link Prediction,Evaluating Link Prediction, Confusion Matrix,Link Prediction Methods:Local Heuristic,Global Heuristic,Probabilistic Models,Supervised Random Walk.

UNIT IV

Information Diffusion:Cascade Model: Decision Based Cascade Model,Cascade in Infinite Chain Model: Generic Model,Generic Model: Case Study,Probabilistic Cascade Model,Compartmental Model of Epidemiology,Analysing Romour Spread: SEIZ Model,Independent Cascade Model,Graph Based Anaomoly Detection: Introduction,Outline,Static Graphs,Static Attributed Graphs,Dynamic Graphs,Deep Learning: Introduction, McMculloch Pitts Neuron, Perceptron Learning Algorithm,Feed Forward Netwrok, Back Propogation,Convolution Nueural Network, Recurrent Neural Network,Mchine Learning Pipelines, Graph Representation Learning,GRL Metod Categories,Matrix Factorisation based GRL Method,Higher Order Proximity Preserved Embedding.

UNIT V

LINE: Large Scale Information Network Embedding,Random Walk Based Methods, Deep walk,Graph Convolution Network, Variations of GCN,SAN Tutorial,Model A Problem Using Networks, Malicious Activities on online Social Networks,Sockpuppets on online Social Networks,Shortcut to become popular on social media,Modelling the spread of COVID-19 Pandemic-SIR Model,Types of Recommender Systems.

TEXT BOOKS:

1. Peter Mika, —Social Networks and the Semantic Web, First Edition, Springer 2007.

2. Borko Furht, —Handbook of Social Network Technologies and Applications, 1st

Edition, Springer, 2010

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COURSE STRUCTURE

A33150-ETHICAL HACKING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

COURSE DESCRIPTION:

The objective of the course is to present an introduction to Ethical techniques with an emphasis on how to organize, maintain and secure the data - efficiently, and effectively.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO1. Describe the fundamental topics of hacking and network connectivity.
CO2. Implement the tools and techniques of Ethical hacking.
CO3. Learn the privacy, design and secure operations using cryptographic algorithms.
CO4. Apply the security and integrity tools in the cryptography system
CO5. Improving the secure and network systems.

SYLLABUS

UNIT I : INTRODUCTION TO ETHICAL HACKING

Introduction to ethical hacking. Fundamentals of computer networking. TCP/IP protocol stack, IP addressing and routing, TCP and UDP, IP subnets, and Routing protocols, types IP version 6.

UNIT II: ATTACKER AND VICTIM SYSTEM

Installation of attacker and victim system, Information gathering using advanced google search,archive.org, netcraft, whois, host, dig, dnsenum and NMAP tool**.** Vulnerability scanning using NMAP, Vulnerability scanning using NMAP and Nessus. Creating a secure hacking environment.

UNIT III : SYSTEM HACKING

Introduction, System Hacking password cracking, privilege escalation, application execution. Malware and Virus. ARP spoofing and MAC attack. Introduction to cryptography, private-key encryption, public-key encryption. Cryptographic hash functions, digital signature and certificate, applications. Steganography, biometric authentication, network-based attacks.

UNIT IV :DNS AND EMAIL SECURITY.

Introduction, Packet sniffing using Wireshark and burp suite, password attack using burp suite.Social engineering attacks and Denial of service attacks. Elements of hardware security: side-channel attacks, physical inclinable functions, hardware trojans.

UNIT V :SECURE BOOT MECHANISMS

Introduction,Different types of attacks using Metasploit framework: password cracking, privilege escalation, remote code execution, etc.Attack on web servers: password attack, SQL injection,Case studies: various attacks scenarios and their remedies.

TEXTBOOKS:

1. Data and Computer Communications -- W. Stallings.
2. Introduction to Computer Networks and Cybersecurity -- C-H. Wu and J. D. Irwin
3. Cryptography and Network Security: Principles and Practice -- W. Stallings

Reference Books:

1. Data Communication and Networking -- B. A. Forouzan
2. TCP/IP Protocol Suite -- B. A. Forouzan
3. UNIX Network Programming -- W. R. Stallings

Online Learning Resources:

1) Ethical Hacking Professional Certificate | NPTEL-12 weeks course

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSESTRUCTURE

A33149– Cloud Computing

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a comprehensive introduction to Cloud Computing, focusing on its architecture, service models, resource management, security, and emerging trends. It covers fundamental concepts and advanced topics, offering practical insights into managing and utilizing cloud resources effectively. Students will explore various cloud deployment models, service types, and security measures while gaining expertise in cutting-edge technologies such as serverless computing and Cloud-Fog-Edge analytics.

Course Pre/corequisites

- Basic Knowledge of Computer Science
- Introduction to Networking
- Basic Understanding of Operating Systems
- Fundamentals of Databases

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A33149.1 Understand the fundamental concepts of Cloud Computing, including service and deployment models, and how they differ from traditional IT infrastructures.

A33149.2 Demonstrate knowledge of service management and resource allocation techniques in the cloud, with the ability to manage scalability, elasticity, and performance monitoring effectively.

A33149.3 Analyze and address security challenges in Cloud Computing, including Identity and Access Management (IAM), data privacy, and legal compliance. Compare and evaluate open-source and commercial cloud platforms.

A33149.4 Evaluate emerging cloud computing trends such as Fog and Edge Computing, and understand their applications in real-time data processing, VM resource management, and cloud-enabled analytics.

A33149.5 Prepare Gain expertise in server less computing and the Function as a Service (FaaS) model, while exploring case studies, cloud analytics and future advancements in cloud technologies such as AI and edge computing.

3. Course Syllabus

UNIT-I

Introduction to Cloud Computing and Architecture:

Introduction to Cloud Computing: Definition, Evolution of Cloud Computing, Characteristics, Advantages, and Disadvantage, Cloud Service Models (IaaS, PaaS, SaaS), Deployment Models (Public, Private, Hybrid, and Community Clouds)

Cloud Computing Architecture: Cloud Components: Client, Datacenter, Distributed Servers

Virtualization in Cloud Cloud Architecture Layers Cloud Computing Reference Architecture.

UNIT-II

Cloud Service and Resource Management

Service Management in Cloud Computing: Service Models in Cloud Computing (IaaS, PaaS, SaaS), Cloud Service Providers, SLA (Service Level Agreements) in Cloud

Data and Resource Management in Cloud Computing: Data Storage in Cloud, Storage as a Service Resource Allocation Techniques, Scalability and Elasticity in Cloud, Load Balancing, and Auto-scaling in Cloud.

UNIT-III

Cloud Security and Platforms

Cloud Security: Security Issues and Challenges in Cloud, Identity and Access Management (IAM), Data Privacy and Protection in Cloud, Legal and Compliance Aspects

Open Source and Commercial Clouds: Overview of Popular Cloud Platforms (AWS, Google Cloud, Azure), Open Source Cloud Platforms (OpenStack, CloudStack), Introduction to Cloud Simulators (CloudSim).

UNIT-IV

Advanced Cloud Concepts and Trends

Research Trends in Cloud Computing: Current Trends and Challenges in Cloud, Introduction to Fog Computing and Edge Computing, and Cloud-Fog-Edge Continuum

Virtual Machine Resource Allocation and Monitoring: VM Scheduling and Resource Allocation, Techniques for Resource Monitoring and Management, Containerization and Docker.

UNIT-V

Serverless Computing and Future Trends

Cloud-Fog-Edge Enabled Analytics: Cloud Analytics and Big Data Processing in Cloud-Fog-Edge Environments, Real-time Data Processing and IoT Integration

Serverless Computing and FaaS (Function as a Service): Introduction to Serverless Architectures, Function as a Service Model (FaaS), Event-driven Architectures in Cloud

Case Studies and Recent Advancements: Case Studies of Cloud Implementations, Latest Trends and Advancements in Cloud Technologies.

4. BooksandMaterials

Text Books:

1. *Thomas Erl, Zaigham Mahmood, and Ricardo P. W. Da Silva, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013*.
2. Michael J. Kavis, Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS), Wiley, 2014.
3. Nikos Antonopoulos and Lee Gillam (Editors), Cloud Computing: Principles, Systems and Applications, Springer, 2010.
4. Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Morgan Kaufmann, 2013.

ReferenceBooks:

1. David S. Linthicum, Cloud Computing and SOA Convergence in Your Enterprise: A Step-by Step Guide, Addison-Wesley, 2009.
2. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Media, 2009.

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(AUTONOMOUS)

COURSE STRUCTURE

OPEN ELECTIVES

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

OPEN ELECTIVES

Course Code	Title of the Course	Offered by
A30181	Basic Civil Engineering	CE
A30182	Building Planning and Construction	CE
A30183	Disaster Management	CE
A30184	Water Resources Conservation	CE
A30281	Fundamentals of Electrical Engineering	EEE
A30282	Renewable Energy Sources	EEE
A30283	Electrical Measuring Instruments	EEE
A30284	Control Systems Engineering	EEE
A30381	Optimization Techniques	ME
A30382	Mechanical Technology	ME
A30383	Automobile Systems and Applications	ME
A30384	Manufacturing Processes	ME
A30387	Rapid Manufacturing	ME
A30474	Introduction to internet of things	ECE
A30481	Principles of Communication Systems	ECE
A30482	Signal Processing & Applications	ECE
A30483	Fundamentals of IoT	ECE
A30484	Introduction to Embedded Systems	ECE
A30581	Basic Data Structures	CSE
A30582	Fundamentals of DBMS	CSE
A30583	Basics of Software Engineering	CSE
A30584	Python for Every One	CSE
A30585	Computer Organization and Operating Systems	CSE
A30587	Fundamentals of Web Technologies	CSE
A30588	Introduction to Java Programming	CSE
A33148	Introduction to Industry 4.0 and Industrial Internet of Things	CAI
A33149	Cloud Computing	CAI
A33150	Ethical Hacking	CAI
A33188	Agile Methodologies	CAI
A33545	Adhoc and Wireless Sensor Networks	CSO
A33546	Ethics in Information Technology	CSO
A33547	Drone Technologies	CSO
A33548	Computer Communication Networks	CSO

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Course Code	Title of the Course	Offered by
A30081	Research Methodology	H&S
A30082	Intellectual Property Rights	H&S
A30083	National Service Scheme	H&S
A30084	Yoga	H&S
A30085	Design Thinking	H&S
A30086	Management Science	H&S
A30087	Entrepreneurship Development	H&S
A30088	E-business	H&S
A30090	Product and Brand Management	H&S
A30091	Management Information Systems	H&S
A30093	Human Factor Engineering	H&S

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30181 – BASIC CIVIL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is designed to impart the basic knowledge about civil engineering to the students of other branches of engineering. The course includes materials for construction, basic surveying and other basic concepts of irrigation, water supply and geotechnical engineering. It provides the significance of the civil engineering profession satisfying societal needs.

Course Pre/corequisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30181.1 Classify various materials and components used in building construction.

A30181.2 List out different domains like Structural, Transportation and Geotechnical Engineering in Civil engineering stream.

A30181.3 Identify types of soils and foundations for various structures.

A30181.4 Measure the linear and angular parameters using concepts of surveying.

A30181.5 Develop water supply system for domestic and irrigational needs.

3. Course Syllabus

UNIT-I

Introduction to civil engineering & construction materials: Importance and scope of civil engineering, characteristics, types and their uses of stones, bricks, timber and cement

UNIT-II

Survey and highway engineering: Definition and classification of surveying, linear and angular measurements, leveling-modern instruments

UNIT-III

Modes of transportation: classification of highways - classification of pavements, curves, super elevation

UNIT-IV

Geotechnical engineering: Origin of soil, types of soil, bearing capacity of soil, types of foundation, shallow and deep

UNIT-V

Irrigation and water supply: Definition and classification of irrigation, irrigation structures, dams, weirs, cross drainage works, canal drops and quality of water-treatment methods

4. Books and Materials

Text Book(s)

1. B.C.Punmia, Ashok K Jain, Arun K Jain, *Basic Civil Engineering*, Laxmi Publications (P) Ltd, 1st edition, 2003.
2. G K Hiraskar, *Basic Civil Engineering,* Dhanpat Rai Publication, 1st edition, 2004.

Reference Book(s)

1. K.R. Arora, *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Delhi, 7th edition 2014.
2. B C Punmia Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi, 16th edition, 2005.
3. Abe Kruger, *Green Building*, 5th edition, 2012.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30182 – BUILDING PLANNING AND CONSTRUCTION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of the course is to learn about building by-laws laid by planning authorities, apply the principles and methods to be followed in constructing various components of a building & understand about masonry types in brick and stone construction. This course provides sequential approach towards constructional activities like flooring, carpentry, plumbing and electrical works etc.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30182.1 Plan buildings by adhering to laws laid by regulatory bodies.

A30182.2 Classify different masonry types of brick and stones used in construction.

A30182.3 Select appropriate floors and roofs for a proposed building.

A30182.4 Identify building materials which can be employed in construction.

A30182.5 Make use of damp proofing techniques to prevent ingress of water in buildings.

3. Course Syllabus

UNIT-I

Residential Buildings: Introduction, Different types of residential buildings- Detached house, semi-detached house, row house or chawls, block of flats or terrace house, duplex type houses, selection of site for residential building, factors effecting the selection of site, components of building, by-laws and regulations, orientation of buildings-factors effecting orientation, C.B.R.I suggestions for obtaining optimum orientation.

UNIT-II

Masonry: Stone masonry - definitions of terms used in masonry, materials for stone masonry, classifications of stone masonry, dressing of stones. Brick masonry - introduction, types of bricks, bonds in brick work, comparison of brick masonry and stone masonry. Composite masonry-introduction, stone composite masonry, brick-stone masonry, concrete masonry, hollow clay blocks masonry, reinforced brick masonry.

UNIT-III

Floors and Roofs: Ground floor - components of a floor, materials used for floor construction, different types of flooring, upper floors - introduction, steel joist and stone or precast concrete Slab floor, Jack arch floors, reinforced cement concrete floors, Ribbed or hollow tiled flooring,

precast concrete floors, timber floors, types of roofs- pitched roofs, single roofs, double or purlin roofs, trussed roofs.

UNIT-IV

Doors and Windows: Introduction, frame, shutters, head, sill, horn, rebate, location of doors and windows, size of doors and windows, types of doors, classifications of doors - arrangement of components, method or manner of construction, working operations, metal doors, types of windows, classifications of windows, ventilators, fixtures and fastenings, installing door and window frames.

UNIT-V

Damp proofing: Introduction, causes of dampness on buildings, effects of dampness on buildings, precautions, materials used for damp proofing, methods of damp proofing, DPC treatment in building problems, fire hazards, fire resisting properties of common building materials.

4. Books and Materials

Text Book(s)

1. Kumara Swamy N &Kameswara Rao A, *Building planning and Drawing*, Charotar Publishers, 6th Edition, 1998.
2. B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, *Building Construction*, Laxmi Publications, 10th Edition, 2008.

Reference Book(s)

1. S.K. Duggal, *Building Materials*, New Age International Publishers, 4th Edition, 2010.
2. D.N. Ghose, *Materials of construction*, Tata-McGraw-Hill Publishing Company Limited, 1st Edition, 1989.
3. Sushil Kumar Sushil Kumar, (2003), *Engineering Materials*, Metropolitan Book Co., Private Ltd., New Delhi.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30183 – DISASTER MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides knowledge on environmental hazards and disasters. The syllabus includes the basics of endogenous and exogenous hazards and gives a suitable picture on the different types of hazard and disasters. This course will enable the student to apply different management techniques to the hazards and disasters.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30183.1 Classify different kind of hazards/disasters and their effects on environment.

A30183.2 Analyze the causes of hazards/disasters which effects human life.

A30183.3 Apply disaster management through engineering applications.

A30183.4 Apply suitable mitigation measures to minimize the effects of hazards and disasters.

3. Course Syllabus

UNIT-I

Environmental Hazards and Disasters: meaning of environmental hazards, environmental, disasters and environmental stress, concept of environmental hazards, environmental, stress and environmental disasters, different approaches and relation with human ecology, landscape approach - ecosystem approach - perception approach - human ecology and its application in geographical researches.

UNIT-II

Types of Environmental Hazards and Disasters: Natural hazards and disasters, man induced hazards and disasters, natural hazards - planetary hazards/disasters, extra planetary hazards/disasters, planetary hazards - endogenous hazards – exogenous hazards.

UNIT-III

Endogenous Hazards: Endogenous hazards, volcanic eruption, earthquakes, landslides, volcanic hazards/disasters - causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions, earthquake hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes, earthquake hazards in India, human adjustment, perception and mitigation of earthquake.

UNIT-IV

Exogenous Hazards/disasters: Exogenous hazards/disasters, infrequent events, cumulative atmospheric hazards/disasters infrequent events: cyclones, lightning, hailstorms cyclones:

tropical cyclones and local storms, destruction by tropical cyclones and local storms (causes, distribution human adjustment, perception and mitigation) cumulative atmospheric hazards/disasters: floods- droughts, cold waves, heat waves. Floods: causes of floods, flood hazards India, flood control measures (human adjustment, perception and mitigation). Droughts: impacts of droughts, drought hazards in India, drought control measures, extra planetary hazards/disasters, man induced hazards/disasters, physical hazards/disasters-soil erosion.

UNIT-V

Soil Erosion: Mechanics and forms of soil erosion, factors and causes of soil erosion, conservation measures of soil erosion. Chemical hazards/disasters, release of toxic chemicals, nuclear explosion, sedimentation processes. Sedimentation processes: global sedimentation problems- regional sedimentation problems, sedimentation and environmental problems, corrective measures of erosion and sedimentation. Biological hazards/disasters: population explosion.

4. Books and Materials

Text Book(s)

1. Rajib Shah, *Disaster Management*, Universities Press, India, 2nd Edition, 2003.
2. Tushar Bhattacharya, *Disaster Science and Management*, TMH Publications, 1st Edition, 2012.

Reference Book(s)

1. Donald Hyndman & David Hyndman, *Natural Hazards & Disasters*, Cengage Learning, 4th Edition, 2013.
2. R.B. Singh (Ed), *Disaster Management*, Rawat Publication, New Delhi, 1st Edition, 2006.
3. Kates, B.I & White, *The Environment as Hazards*, G.F, Oxford Publishers, New York, 1978.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30184 – WATER RESOURCES CONSERVATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course introduces the great need to conserve and plan the water resources in more efficient way because of urbanization and depletion of water resources. The course content enables the students to learn water hydrology, importance of water conservation and methods to conserve water resources.

Course Pre/corequisites

The Course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30184.1 Interpret ground and surface water utilization for conservation of water resources.

A30184.2 Apply the concepts of artificial ground water recharge to increase ground water level.

A30184.3 Make use of the concepts of harvesting for preservation of water.

A30184.4 Utilizenew technologies like ion exchange and UV radiation techniques to recycle and reuse waste water.

A30184.5 Plan efficient use of water resources with minimum energy.

3. Course Syllabus

UNIT-I

Ground and surface water utilization- Hydrologic cycle, water budget, ground water level fluctuations and environmental influence.

UNIT-II

Artificial ground water recharge- Concept and methods of artificial ground water recharge mounds and induced recharge, wastewater recharge for reuse, water spreading, farm ponds and percolation tanks.

UNIT-III

Water harvesting- Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, and check dams.

UNIT-IV

Reuse & recycle of waste water-Types of reuse, application of treated waste water, purity of reclaimed water, guidelines and regulations, new technologies used in recycling of waste water.

UNIT-V

Watershed management- Concept of watershed management, policies and decision making, concept of watershed development, objectives of watershed development, need for watershed development in India, integrated and multidisciplinary approach for watershed management.

4. Books and Materials

Text Book(s)

1. Ramakrishnan S., *Ground water*, Sci -Tech Publications, 2nd edition, 2010.
2. B.C. Punmia& Pande B.B. Lal, *Irrigation and Water Power Engineering*; Laxmi Publications pvt. Ltd., New Delhi.

Reference Book(s)

1. S.N. Chatterjee, *Water Resources, Conservation and management*, Atlantic Publishers, 1st edition, 2018.
2. Murthy J.V.S, *Watershed Management*, New Age International Publishers, 2nd edition, 2017.
3. Murthy V.V.N, *Land and Water Management*, Kalyani Publications, 1st edition, 2018.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30281 – FUNDAMENTALS OF ELECTRICAL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is to familiarize the students about the basics of electrical engineering, circuit theory and electrical machines. This course introduces the fundamental concepts, basic knowledge of electrical quantities, network theorems for the analysis of basic DC and AC circuits. It also deals with the working principle, construction and operation of DC machines and AC machines. These machines are used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A30281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.

A30281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A30281.4 Test the Performance of DC machines, AC machines and single-phase transformers.

3. Course Syllabus

UNIT-I

DC Circuits: Circuit concept, types of network elements, ohm's law, types of sources voltage - current relationship for passive element (R, L & C), Kirchhoff's laws, network reduction techniques: series, parallel, combination of series and parallel, delta - star transformation, loop and nodal analysis.

Network Theorems: Thevenin's, Norton's, superposition and maximum power transfer theorems (DC excitation only).

UNIT-II

AC Circuits: Representation of alternating quantities, peak, average, RMS, form factor and peak factor for sinusoidal wave form. J-notation, Analysis of single-phase AC circuits consisting of pure R, L & C circuits, combination of RL, RC and RLC (only series) circuits.

UNIT-III

D.C Generators: Constructional details of D.C. generator, principle of operation of D.C. generators, types of D.C generators, E.M.F equation.

D.C Motors: Principle of operation of DC motors, back emf, torque equation, Swinburne's test, speed control of DC motors by armature and field control methods.

UNIT-IV

1-phase Transformers: Principle of operation, constructional details, E.M.F. equation, losses and efficiency, OC and SC tests.

UNIT-V

3-Phase Induction Motors: Principle of operation, types of induction motors, slip, torque equation, torque-slip characteristics.

3-phase Alternators: Principle of operation - constructional details-EMF equation.

4. Books and Materials

Text Book(s)

1. V.K. Mehta and Rohith Mehta, *Basic electrical engineering*, S. Chand publishers, 14th edition.
2. M.S. Naidu and S. Kamakshaiah, *Introduction to Electrical Engineering*, Tata McGraw Hill Publishers, 1st edition, 2004.

Reference Book(s)

1. A Sudhakar, Shyammohan S Palli, *Circuits and Networks*, Tata McGraw-Hill, 4th edition.
2. D. C. Kulshreshtha, *Basic Electrical Engineering*, McGraw Hill, 2009.
3. L. S. Bobrow, *Fundamentals of Electrical Engineering*, Oxford University Press, 2011.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30282 – RENEWABLE ENERGY SOURCES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The purpose of this course is to enable the student to acquire knowledge on various Power Generation Systems. The primary objective of this course is to introduce solar energy, its radiation, collection, storage and application. It also deals with production of quality of energy, types of generation plants and their principles of operation, methods of energy storage and economics of generation.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30282.1 Apply the principles of Renewable energy sources for the construction of Power generating station.

A30282.2 Analyze the various energy conversion systems and their limitations.

A30282.3 Analyze Renewable energy sources for various environmental conditions.

A30282.4 Analyze the generation principles and operation of variety of sources of energy.

3. Course Syllabus

UNIT-I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, environmental impact of solar power, physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection, Storage and Applications: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. **Storage and Applications:** Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy and Bio Mass: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. engine operation and economic aspects.

UNIT-IV

Other Sources of Energy: Resources, types of wells, methods of harnessing the energy, potential in India. Ocean energy: OTEC, principles utilization, setting of OTEC plants, thermodynamic cycles. **Tidal and wave energy:** Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Energy Storage and Economy: Energy storage - energy in transportation - Magneto hydrodynamic power generation- hydrogen economy

4. Books and Materials

Text Book(s)

1. G.D. Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 4th edition 2008.
2. JhonTwidell and tony Weir, *Renewable Energy Resources*, 2nd edition, Taylor and Francis Group, 2006.

Reference Book(s)

1. Twidell&Weir, *Renewable Energy Sources*, Tata McGraw Hill Education Private Limited, New Delhi, 4th edition 2009.
2. S. N. Bhadra, D. Kastha& S. Banerjee, *Wind Electrical Systems* – Oxford University Press, 2013.

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COURSE STRUCTURE

A30283 – ELECTRICAL MEASURING INSTRUMENTS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different electrical measuring instruments used to measure electrical quantities. The minimization of different errors and their effects in measuring instruments are discussed. Here the concepts of single phase and three phase circuits are discussed to determine the voltage, current, power and energy. Also, the concepts of bridges are discussed, which are used for the measurement of unknown resistance, inductance and capacitance. These electrical measuring instruments are used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30283.1 Categorise various electrical instruments used for measuring electrical parameters.

A30283.2 Design appropriate arrangement for extension of range in measuring instruments.

A30283.3 Analyze the errors and compensations in various electrical measuring instruments.

A30283.4 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.

A30283.5 Estimate the unknown quantities of resistance, inductance and capacitance using bridges.

3. Course Syllabus

UNIT-I

Measuring Instruments: Classification, deflecting, control and damping torques, ammeters and voltmeters, PMMC, moving iron and dynamometer type instruments, expression for the deflecting torque and control torque, errors and compensations, extension of range using shunts and Series resistance.

UNIT-II

Potentiometers: Principle and operation of D.C. Crompton's potentiometer, standardization, measurement of unknown resistance, current, voltage.

UNIT-III

Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, double element and three element dynamometer wattmeter's, expression for deflecting and control torques, extension of range of wattmeter using instrument transformers, measurement of active and reactive powers in balanced and unbalanced systems.

UNIT-IV

Measurement of Energy: Single phase induction type energy meter, driving and braking torques errors and compensations, testing by phantom loading. Three phase energy meters.

UNIT-V

DC Bridges: Method of measuring low, medium and high resistance, Whetstone's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, loss of charge method, megger method.

AC Bridges: Measurement of Inductance, Maxwell's bridge, Anderson's bridge. Measurement of capacitance, Desauty's bridge, Schering bridge.

4. Books and Materials

Text Book(s)

1. A.K. Sawhney, *A course on Electrical and Electronics Measurements & Instrumentation*, DhanpatRai and Co. Publishers, 19th edition, 2015.
2. J.B. Gupta, *A course on Electrical and Electronics Measurements & Instrumentation*, S.K. Kataria publishers, 14thedition, 2014.

Reference Book(s)

1. U.A. Bakshi, A. V. Bakshi, *Electrical measurements and Instrumentation*, Technical publications, 1st edition, 2009.
2. E. W. Golding & F.C. Widdis, *Electrical Measurements and Measuring Instruments*, Wheeler publishers, 5th edition, 1997.
3. H S Kalsi, *Electronic Instrumentation*, Tata McGraw-Hill, 3rd edition, 2010.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30284 – CONTROL SYSTEMS ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different control systems applied to electrical systems. This course deals with the types of control systems, mathematical modeling of physical systems, time response analysis, frequency response analysis and its stability techniques. It also covers the state space analysis of linear systems. The main applications of control systems are in automation industry, Robotics, Space Technology and Ship stabilization systems.

Course Pre/corequisites

A30002- Mathematics-I

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30284.1	Determine the transfer function of a given system using different techniques.
A30284.2	Analyze the response of a given system in time and frequency domains.
A30284.3	Test the stability, observability and controllability of a given system.
A30284.4	Apply suitable technique for calculating the gain margin and phase margin of a given system.

3. Course Syllabus

UNIT-I

Introduction: Open loop and closed loop systems and their differences, different examples of control systems, effect of feedback on gain, sensitivity and stability.

Mathematical Modelling of Physical Systems: Transfer function of translational and rotational mechanical systems, Force (Torque)-Voltage and Force (Torque)-Current analogies, block diagram reduction techniques, signal flow graphs and Mason's gain formula, transfer function of armature controlled, field controlled D.C servo motors, transfer function of A.C. Servo motor.

UNIT-II

Time Response Analysis: Standard test signals, unit impulse and step response of first order systems,unit step response of second order system, time response specifications, steady state errors and error constants, dynamic error coefficients, effects of proportional, derivative, proportional derivative, proportional integral and PID controllers.

UNIT-III

Stability Analysis: Introduction to stability, necessary and sufficient conditions for stability, Routh's stability criterions and its limitations, relative stability.

The Root Locus Concept: Root locus concept, rules to construct root locus, graphical determination of 'k' for specified damping ratio, relative stability, effect of adding zeros and poles to transfer function on root locus.

UNIT-IV

Frequency Domain Analysis: Introduction, frequency domain specifications, correlation between time and frequency responses, stability analysis from Bode plot and Nyquist plot, calculation of gain margin and phase margin, determination of transfer function from Bode diagram.

UNIT-V

Compensators: Lag, lead, lead - lag networks.

State Space Analysis: Concept of state, state variables and state model, physical, phase and canonical variable representation of state models, derivation of transfer function from state models, diagonalization, solving the time invariant state equations, state transition matrix and its properties, concepts of controllability and observability.

4. Books and Materials

Text Book(s)

1. I J Nagrath and M Gopal, *Control System Engineering,* New Age International Publication,5th edition, 2007.
2. Katsuhiko Ogata, *Modern Control Engineering*, Prentice Hall of India, 5th edition, 2010.

Reference Book(s)

1. A. Nagoor Kani, *Control Systems Engineering*, RBA publications, 2nd edition, 2009.
2. B. C. Kuo and FaridGolnaraghi, *Automatic Control Systems*, John Wiley, 8th edition, 2003.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30381 – OPTIMIZATION TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with modelling and optimization of the problems with limited resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

Course Pre/corequisites

The course has no specific prerequisite and Corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30381.1 Apply various Operations Research models and methods to real world problems.

A30381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A30381.3 Evaluate various alternatives available to find optimal solution for real world problems.

A30381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A30381.5 Decide the best operating policy for the efficient use of resources.

3. Course Syllabus

UNIT I

Operations Research: Scope, O.R models, Linear Programming - Formulation, graphical method, simplex method, big -M method and special cases.

UNIT II

Assignment Model: Formulation, optimal solution by Hungarian method, maximization problem, balanced and unbalanced problems, restriction models.

Sequencing Models: Introduction, Johnson's Rule, processing n jobs through two machines, processing n jobs through three machines and processing n jobs through m machines.

UNIT III

Transportation Problem: Introduction, finding initial basic feasible solutions, optimality test, alternate solutions and unbalanced transportation problem.

UNIT IV

Game Theory: Introduction, minimax (maximin) method of optimal strategies, saddle point, value of the game, rectangular games without saddle point, dominance principle, graphical method.

Queuing Theory: Introduction, terminology, single channel models with finite queue length and non-finite queue length.

UNIT V

Introduction to Project Management: Terminology, methods of finding critical path -critical path method (CPM), project evaluation and review technique (PERT) - probability of completing the project within scheduled time and crashing.

4. Books and Materials

Text Book(s)

1. S.D. Sharma, *Operations Research*, New Delhi: Kedarnath Publications, 2017
2. S.R. Yadav and A.K. Malik, *Operations Research*, New Delhi: Oxford University Press, 2014.

Reference Book(s)

1. Hamdy Abdelaziz Taha,*Operations Research*: *an Introduction*, 9th edition, Pearson, Boston,2015.
2. Prem Kumar Gupta & D S Hira*, Operations Research*, Revised edition, New Delhi: S. Chand Publishing, 2015.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30382 – MECHANICAL TECHNOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides knowledge to select the required material for different engineering applications. It also deals with basic concepts of internal combustion engines, compressors, power transmission systems and welding processes. The student will be able to apply the knowledge of engines, materials and welding processes which can be used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30382.1 Identify the types of engines and their cycles.

A30382.2 Classify the reciprocating air compressors and their working principles.

A30382.3 Discus the constructional features of domestic refrigeration and air conditioning systems.

A30382.4 Inspect the mechanism of power transmission elements of various engineering systems.

A30382.5 Select suitable engineering materials and welding methods for real time applications.

3. Course Syllabus

UNIT I

I.C. Engines: working principle, 4 stroke and 2 stroke engines, comparison.

UNIT II

Reciprocating Air compressors: Description and working of single stage and multistage reciprocating air compressors – inter cooling.

UNIT III

Refrigeration systems: Study of household refrigerator, window air conditioner, split air conditioner ratings and selection criteria of above devices

UNIT IV

Transmission of power: Belt, Rope, Chain and gear drive.

UNIT V

Engineering materials and welding processes: Engineering materials, properties of materials, gas welding, arc welding, soldering and brazing.

4. Books and Materials

Text Book(s)

1. R.S Khurmi & JS Gupta, *Thermal Engineering*, New Delhi S Chand, 2012.
2. P.L. Ballaney, *Refrigeration and Air Conditioning,* 2nd edition, 2012.

Reference Book(s)

1. R.K. Jain and S.C. Gupta, *Production Technology*, New Delhi, Khanna Publishers,2012.
2. S.N. Lal, Elements *of Mechanical Engineering*, Cengage Learning, 2013.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30383 – AUTOMOBILE SYSTEMS AND APPLICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a broad knowledge about the automobile mechanisms like transmission, final drive, braking system, front axle, steering, frame and chassis. It also covers emission and electrical systems used in automobiles. This knowledge will be helpful to the student in co- relating various systems with each other and understanding the individual systems in a better manner while using them in daily life.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30383.1 Identify the different parts of the automobile systems used in daily life.

A30383.2 Analyze brakes, steering, axles, suspension and frames of an engine for better performance.

A30383.3 Inspect the mechanism of power transmission elements, and applications of various engineering systems.

A30383.4 Compare the significance of various engines in terms of their performance.

A30383.5 Classify various electrical systems that are used for efficient functioning of automobiles.

3. Course Syllabus

UNIT I

Introduction- History, Industrial revolution, Development in automobile industry, leading manufacturers.

UNIT II

Classification of vehicles: On the basis of load, wheels, final drive, fuel used, position of engine and steering transmission, body and load, layout of an automobile chassis function of major components of a vehicle such as frame, transmission (clutch and gearbox), braking system, types of suspension, principle and its components.

UNIT III

Introduction to thermodynamics: First and second laws of thermodynamics, Otto cycle, diesel cycle. Types of automotive fuels, properties of fuels, air requirement for complete combustion of fuel.

Introduction to IC engines: Concept of two stroke and four stroke petrol and diesel engines and their applications to automobiles, various terms, specification of automobile engines.

UNIT IV

Emissions from automobiles – Pollution standards national and international, pollution control techniques, multipoint fuel injection for SI engines- common rail diesel injection, emissions from alternative energy sources– hydrogen, biomass, alcohols, LPG, CNG.

UNIT V

Electrical system- Charging circuit, generator, current and voltage regulator, starting system, Bendix drive, mechanism of solenoid switch, lighting systems, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.

4. Books and Materials

Text Book(s)

1. Kirpal Singh, Automotive *Mechanics – Vol. 1 & Vol. 2*, Standard Publishers Distributors, 13th edition, 2013
2. R.S Khurmi & JS Gupta, Thermal Engineering, New Delhi S. Chand, 2012.

Reference Book(s)

1. PL Ballaney, *Thermal Engineering*, New Delhi, Khanna Publishers,2013.
2. M.L. Mathur, F.S. Mehta and R.P. Tiwari, Elements of Mechanical Engineering, New Delhi, Jain Brothers,2013

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30384 – MANUFACTURING PROCESSES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides details about converting raw material into finished products using various manufacturing processes. With the knowledge acquired through this course, the students will be able to manufacture the products by reducing the wastage of material.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30384.1 Identify the properties of crystallization of ferrous and nonferrous materials.

A30384.2 Select suitable material for preparing the patterns.

A30384.3 Make use of moulding systems to prepare a product.

A30384.4 Identify the suitable special casting process used for the given application.

A30384.5 Identify the suitable welding process used for the given application.

3. Course Syllabus

UNIT I

Engineering Materials-Industrial Bonds in crystallization of metals, grain and grain boundaries, Determination of Grain size, solid solutions and types, structure and properties of various materials.

UNIT II

Casting: Introduction, steps involved in making a casting, advantages of casting, applications, pattern making, types of patterns, materials used for patterns, pattern allowances, principles of gating system, gating ratio, design of gating system, mould materials, types of moulds, molding methods and molding machines.

UNIT III

Risers - Types, function, casting design considerations, design of feeding systems like sprue, runner, gate, riser and molding flasks.

UNIT IV

Special Casting Processes - Centrifugal, die, investment casting, methods of melting, crucible melting, cupola operation, steel making processes, casting inspection and defects.

UNIT V

Welding: Classification of welding processes, types of welds, welded joints, gas welding, arc welding, forge welding, resistance welding, thermit welding, plasma (air and water) welding, TIG welding, MIG welding, welding defects, causes and remedies.

4. Books and Materials

Text Book(s)

1. P.N. Rao, *Manufacturing Technology*, Volume-I, Tata McGraw Hill, 4th edition, 2013.

Reference Book(s)

1. Schmid and Kalpakin, *Manufacturing Technology*, Pearson education, 7thedition, 2014.
2. P. N. Rao, *Manufacturing Technology*, *Foundry forming and welding*, Volume-I, McGraw Hill education, 5th edition, 2018.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 18thedition, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30474 - INTRODUCTION TO INTERNET OF THINGS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30474.1 Analyze IoT applications using IoT design principles, protocols and levels.

A30474.2 Distinguish sensors and actuators in terms of their functions and applications.

A30474.3 Interface I/O devices, Sensors using Arduino uno.

A30474.4 Apply Python concepts for programming of Raspberry Pi.

A30474.5 Develop IoT applications using Raspberry Pi and Arduino uno.

3. Course Syllabus

Unit I

Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I, Communication Protocols: Part III, Part IV, Part V

UNIT-II

Sensor Networks: Part I, Part II, Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications, Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

Unit III

Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

UNIT-IV

Data Handling and Analytics, Cloud Computing, Sensor-Cloud, Fog Computing, Smart Cities and Smart Homes

UNIT-V

Connected Vehicles, Smart Grid, Industrial IOT, Industrial IOT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

4. Books and Materials

Text Book(s)

1. S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.
2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
3. Jeeva Jose, *Internet of Things,* 1st edition, Khanna Book Publishing, 2019.
4. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain, *Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019.

Reference Book(s)

1. Vijay Madisetti, Arshdeep Bahga, *Internet of Things — A hands on Approach*, 1st Edition, University press, 2014.
2. Adrian McEwen, Hakim Cassimally, *Designing the Internet of Things*, 1st edition, John Wiley and sons 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30481 – PRINCIPLES OF COMMUNICATION SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides the basic knowledge of analog communication systems and their applications. This course covers different continuous modulation techniques and analog pulse modulation schemes. This course also covers the operation of AM and FM receivers and effect of noise on AM, FM and PM receiver performance. This course helps the students in understanding and design of communication systems that are being used today.

Course Pre/corequisites

A30405 - Signals and Systems

2. Course Outcomes (COs)

After completion of this course, the student will be able to:

A30481.1	Explain the operation of different analog communication systems.
A30481.2	Analyze the performance of different modulation schemes used in analog communication systems.
A30481.3	Make use of sampling theorem to generate pulse modulation signals.
A30481.4	Analyze the performance of AM, FM and PM receivers in the presence of noise.
A30481.5	Choose an appropriate modulation technique to design an analog communication system.

3. Course Syllabus

UNIT - I

Amplitude Modulation and Demodulation: Elements of communication systems, Modulation, Amplitude Modulation (AM) - Single tone modulation, power calculations, generation and demodulation of AM signals. Generation and demodulation of DSBSC, SSBSC and VSBSC signals.

UNIT - II

Angle Modulation: Generation and demodulation of Frequency Modulation (FM) and Phase modulation (PM) signals. Narrow band frequency Modulation and wide band frequency modulation.

UNIT - III

Pulse Modulation: Sampling theorem, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).

UNIT - IV

Receivers and Multiplexing: Super-heterodyne AM receiver, pre-emphasis, and de-emphasis, FM capture Effect, FM receiver, frequency-division multiplexing (FDM), time-division multiplexing (TDM).

UNIT - V

Noise: Types of Noise, Narrowband noise - Time domain representation and quadrature representation, filtered white noise, signal to noise ratio, noise equivalent bandwidth, effective noise temperature, and noise figure, Performance analysis of AM, FM, PM receivers in the presence of noise.

4. Books and Materials

Text Book(s)

1. Simon Haykin, *Communication Systems*, Wiley-India edition, 3rd edition, 2010.

Reference Book(s)

1. B.P.Lathi and Zhi Ding, *Modern Digital and Analog Communication Systems*, Oxford University Press, 4th edition, 2010.
2. A. Bruce Carlson and Paul B. Crilly, *Communication Systems– An Introduction to Signals and Noise in Electrical Communication*, McGraw-Hill,5th edition, 2010.
3. Kennedy and Davis, *Electronic Communication Systems*, McGraw-Hill 4th edition, 1999.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30482 – SIGNAL PROCESSING AND APPLICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This is an introductory course to all communication engineering subjects. This course deals withclassification of signals and systems in continuous and discrete time domains. The representation of signals in frequency domain is discussed in detail. This course also presents the sampling process of the signals and applications of the signals in various fields.

This course serves as an elementary subject for signal and image processing.

Course Pre/Co-requisites

1. A30002 – Mathematics – I
2. A30010 – Mathematics – II

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:
A30482.1 Distinguish between different signals and systems.
A30482.2 Make use of Fourier series for the representation of signals.
A30482.3 Analyze different signals by using an appropriate transform.
A30482.4 Examine the transmission characteristics of linear systems.
A30482.5 Select an appropriate transform to find the transfer function of linear systems.

3. Course Syllabus

UNIT - I

Classification of Signals: Continuous time and discrete time, analog and digital, periodic and aperiodic, energy and power, even and odd, causal and non-causal, deterministic and random, standard test signals.
Operations on signals: Time shifting, time scaling, time reversal and combined operations.

UNIT - II

Classification of Systems: Continuous time and discrete time, analog and digital, instantaneous and dynamic, causal and non-causal, linear and non-linear, time-invariant and time varying, stableand unstable. LTI Systems - Continuous, discrete time systems and properties of LTI systems.

UNIT – III

FOURIER SERIES

Representation of the Fourier series, Properties of Fourier Series and Dirichlet's conditions.

FOURIER TRANSFORMS:

Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform.

UNIT – IV

SAMPLING: Sampling of continuous time signals, sampling theorem, reconstruction of signal from its samples, the effect of under sampling- aliasing, practical aspects of sampling.

UNIT –V Applications of Signal Processing

Audio and video processing, Image processing, Speech processing, Biomedical engineering and Control systems.

4. Books and Materials

Text Book(s)

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, Signals and Systems, Pearson Education, 2nd edition, 1997.
2. B. P. Lathi, Principles of Linear Systems and Signals, Oxford University Press, 2nd edition, 2009.

Reference Book(s)

1. A.Anand Kumar, Signals and Systems, Prentice Hall of India, 2012.
2. Simon Haykin and Van Veen, Signals and Systems, Wiley, 2nd edition, 1998.
3. B.P. Lathi, Signals, Systems and Communications, BS Publications, 2009

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30483 – FUNDAMENTALS OF IOT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course covers the development of internet of things (IoT) products and services including devices for sensing, actuation, processing and communication. This course helps the students to describe the technology around the Internet of Things (IoT). In this course students' study, python concepts, how to interface I/O devices, sensors using Arduino uno and raspberry pi. This course has simple examples with integration of techniques turned into an application.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30483.1 Analyze IoT applications using IoT enablers and connectivity layers, components.

A30483.2 Distinguish sensors and actuators in terms of their functions and applications.

A30483.3 Interface I/O devices, Sensors using Arduino UNO.

A30483.4 Develop Raspberry Pi Interfacing programs using python concepts.

A30483.5 Apply Raspberry Pi and Arduino Uno programming for IoT bases projects.

3. Course Syllabus

UNIT-I

Introduction to IoT: Characteristics of IoT, applications of IoT, IoT categories, IoT enablers and connectivity layers, IoT components.

UNIT-II

Sensors and Actuators: Sensors-definition, characteristics of sensor, classification of sensors, Actuators-definition, types of Actuators.

UNIT-III

Programming with Arduino: Introduction to Arduino UNO, Arduino IDE, Basic commands, serial commands. LED Interface, switch interface, serial interface, temperature sensor interface.

UNIT-IV

Python: Overview of Python, features, comments, variables, operators, data types, If statement, functions, for loop, while loop, strings, lists, tuples, dictionaries.

UNIT-V

Programming with Raspberry Pi: Introduction to Raspberry Pi, Installation of raspbian OS, connecting to laptop, terminal commands, LED Interface, button Interface, DHT sensor interface.

4. Books and Materials

Text Book(s)

1. Jeeva Jose, *Internet of Things,* 1st edition, Khanna Book Publishing, 2019.
2. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahindra Swain, *Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019.

Reference Book(s)

1. Vijay Madisetti, Arshdeep Bahga, *Internet of Things — A hands on Approach*, 1st edition, University Press, 2014.
2. Adrian McEwen, Hakim Cassimally, *Designing the Internet of Things*, 1stedition, John Wiley and Sons, 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30484 – INTRODUCTION TO EMBEDDED SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides an introduction to embedded systems and their architecture considerations. Focus is on TM4C123GH6PM microcontroller which includes internal architecture, instruction set, register organization, addressing modes, on-chip peripherals and data communication protocols. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course will be useful to students as a first level course for embedded systems.

Course Pre/Corequisites

A30432 - Microprocessors and Microcontrollers

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30484.1 Analyze the embedded systems features and architecture considerations

A30484.2 Develop Programs using TM4C123GH6PM Microcontroller

A30484.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices

A30484.4 Apply Serial Communication Protocols for interfacing serial Devices.

A30484.5 Design Embedded Applications using TM4C123GH6PM Controller

3. Course Syllabus

UNIT - I

INTRODUCTION TO EMBEDDED SYSTEMS: Embedded System Introduction, Host and Target Concept, Embedded Applications, Features and Architecture Considerations for Embedded Systems- ROM, RAM, Timers, Data and Address Bus Concept, CISC vs RISC Design Philosophy, Von-Neumann Vs Harvard Architecture, Memory Types, Overview of Design Process of Embedded Systems, Programming Languages and Tools for Embedded Design.

UNIT - II

EMBEDDED CONTROLLER ARCHITECTURE: TM4C123GH6PM Block Diagram, Address Space, On-Chip Peripherals (Analog and Digital), Register Sets, Addressing Modes and Instruction Set Basics.

UNIT - III

OVERVIEW OF TM4C123GH6PM: I/O Pin Multiplexing, Pull Up/Down Registers, GPIO Control, Programming System Registers, Watchdog Timer, Need of Low Power for Embedded Systems,

System Clocks and Control, Hibernation Module on TM4C, Active Vs Standby Current Consumption. Introduction to Interrupts, Interrupt Vector Table, Interrupt Programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

UNIT - IV

TOOLS OF EMBEDDED SYSTEMS: Embedded Hardware and Various Building Blocks, Processor Selection for an Embedded System, I/O Devices and I/O Interfacing Concepts, Timer and Counting Devices, Design Cycle in the Development Phase for an Embedded System, Uses of In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System, Design Metrics of Embedded Systems – Low Power, High Performance, Engineering Cost, Time-To-Market.

UNIT - V

EMBEDDED COMMUNICATIONS PROTOCOLS: Serial Communication Basics, Synchronous/Asynchronous Interfaces (Like UART, SPI, and I2C), Baud Rate Concepts, Implementing and Programming UART, SPI and I2C, SPI Interface Using TM4C.Case Study: Tiva Based Embedded System Application using the Interface Protocols for Communication with External Devices “Sensor Hub Booster Pack”.

4. Books and Materials

Text Book(s)

1. Raj Kamal. *Embedded Systems,* 2nd Edition, Tata McGraw-Hill Education, 2011.
2. Jonathan W Valvano. *Introduction to ARM Cortex - M Microcontrollers*, 5th Edition, Create space Publications.

References

1. http://processors.wiki.ti.com/index.php/HandsOn_Training_for_TI_Embedded_Processors.
2. http://processors.wiki.ti.com/index.php/MCU_Day_Internet_of_Things_2013_Workshop.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30581 – BASIC DATA STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The aim of this course is to provide insight in organizing data types logically to access and configure the data. The concepts of linear and non-linear data structure algorithms are discussed. It improves the problem-solving ability of a learner to a great extent which can be applied in various fields of engineering.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

After completion of the course, the student will be able to:

A30581.1 Analyze the time and space complexities of algorithms.

A30581.2 Apply various operations on linear data structures.

A30581.3 Design searching and sorting techniques for a given application.

A30581.4 Develop nonlinear programming for optimization techniques.

3. Course Syllabus

UNIT-I

Introduction and Overview: Definition, concepts of data structures, overview and implementation of data structures.

UNIT-II

Linear Data Structures: Stacks- Introduction, definition, representation of stack, operations on stacks, applications of stacks, queues- introduction, definition, representations of queues, various queue structures, applications of queues.

UNIT-III

Linked lists: Definition, single linked list, circular linked list, double linked list, circular double linked list, application of linked lists.

UNIT-IV

Sorting and Searching: Sorting- Bubble sort, selection sort, insertion sort, merge sort, quick sort, time complexity. Searching - sequential search, binary search, time complexity.

UNIT-V

Trees and Graphs: Trees- Examples, vocabulary and definitions, binary tree applications, tree traversals, binary search trees. Graphs- vocabulary and definitions, applications: BFS and DFS.

4. Books and Materials

Text Book(s)

1. Debasis Samanta, *Classic Data Structures*, 2nd edition, PHI, 2014.

Reference Book(s)

1. G A Vijaya lakshmi Pai, *Data Structures and Algorithms*, TMH, 2008.
2. Horowitz, Sahni and Anderson Freed, *Fundamentals of Data Structures in C*, 2nd edition, Universities Press, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30582 – FUNDAMENTALS OF DBMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course enlightens the learners with the fundamentals of database and its applications. It covers various data models, Entity Relationship diagrams, SQL queries and indexing techniques. The learners of this course can choose the domain of Data Engineering and can opt their carrier path in database administration or data analytics.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

A30582.1 Apply suitable data models for given application.

A30582.2 Design database using integrity constraints and ACID properties.

A30582.3 Construct optimized SQL queries to solve real time problems.

A30582.4 Apply suitable normal form to eliminate data redundancy.

A30582.5 Choose appropriate index structure to improve performance.

3. Course Syllabus

UNIT-I

Introduction: Basics of database system applications, principle of database systems, view of data - data abstraction, instances and schemas, data models, database Languages - DDL, DML, ER diagrams.

UNIT-II

Relational Model: Fundamentals of relational model - Integrity constraints over relations, enforcing integrity constraints, querying relational data, logical data base design, views, ACID properties.

UNIT-III

SQL: Basic SQL queries, introduction to sub queries, correlated sub queries, set - comparison operators, aggregate operators, NULL values, logical operators, joins.

UNIT-IV

Normalizations: Redundancy issues, decompositions, functional dependencies, various normal forms.

UNIT-V

Data on External Storage: File organization and various indexing structures.

4. Books and Materials

Text Book(s)

1. Raghurama Krishnan, *Johannes Gehrke, Database Management Systems,* McGraw-Hill Education, 3rd edition, 2014.

Reference Book(s)

1. A. Silberschatz, H.F. Korth, Sudarshan, *Database System Concepts*, McGraw Hill, 6th edition, 2012.
2. Ramez Elmasri, Shamkat B. Navathe, *Database Systems,* Pearson Education, 6th edition 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30583 – BASICS OF SOFTWARE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with engineering principles and programming languages applied in software development. These principles include analyzing user requirements, designing, building, and testing software. The knowledge acquired through this course is used to handle big projects efficiently with minimizing cost and reduced complexity.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30583.1 Apply the phases of software development life cycle in application development.

A30583.2 Identify software requirements for construction.

A30583.3 Design requirement engineering process for change management.

A30583.4 Apply the design concepts for design models.

A30583.5 Construct the various testing techniques for software systems.

3. Course Syllabus

UNIT-I

Introduction: Software engineering and process models: Introduction, changing nature of software, software myths.

UNIT-II

Process Models: Waterfall model, incremental process models, evolutionary process models, the unified process, agile process models.

UNIT-III

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, the software requirements document.

UNIT-IV

Requirement Engineering Process: Feasibility studies, requirements elicitation and analysis, requirement validation, requirement management.

UNIT-V

Design: Design process and design quality, design concepts-abstraction, information hiding, functional independence, refactoring, modularity, refinement, design classes, design model.

Testing: Testing strategies-A strategic approach to software testing, test strategies for conventional software, white box testing, black box testing, validation testing, system testing.

4. Books and Materials

Text Book(s)

1. Roger S. Pressman, *Software Engineering*, A Practitioner's Approach, McGraw Hill, International Edition, 8th edition, 2015.

Reference Book(s)

1. Sommerville, *Software Engineering*, Pearson education, 7th edition, 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30584 – PYTHON FOR EVERYONE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The aim of this course is to provide the fundamentals of Python language. It covers data types, operators, control statements, data structures, functions, modules, exception handling and file handling concepts. This course helps the student in selecting a domain path leading to software engineering in the segment of Artificial intelligence, Data Science and IoT.

Course Pre/Corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30584.1 Apply the basic constructs of Python to solve problems.

A30584.2 Organize lists, tuples and dictionaries appropriately to solve complex problems.

A30584.3 Build functions to increase code reusability.

A30584.4 Implement modular programming for organized software development.

A30584.5 Make use of exception handling for robust programming.

3. Course Syllabus

UNIT-I

Introduction to python programming: History of python, basics, python character set, tokens, data types, input and output functions, formatting numbers and strings, operators.

Control statements: Decision making statements, loop control statements, nested loops, break and continue statements.

UNIT-II

Data Structures: Sequence, lists, tuples, sets, dictionaries. Functional programming: filter (), map (), reduce (), python strings.

UNIT-III

Functions- Basics of functions, syntax, local and global scope of a variable, Recursions, lambda functions, parameters and arguments in functions.

UNIT-IV

Modules: The from…import statement, making your own modules, dir() function, the python module, modules and namespaces, packages, standard library modules.

UNIT-V

Exceptions: Introduction, handling exceptions, multiple except blocks, else clause, raising exceptions, finally block, re-raising exception.

File Handling: Introduction, need of file handling, text input and output files, seek function, binary files, extracting data from a file.

4. Books and Materials

Text Book(s)

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, *Programming and problem solving with python,* McGraw-Hill Education, 2018.

Reference Book(s)

1. Martin C.Brown, *The Complete Reference: Python*, McGraw-Hill, 2018.
2. Reema Thareja, *Python programming using problem solving approach*, Oxford, 2019.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30585 – COMPUTER ORGANIZATION AND OPERATING SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is a combination of computer organization and operating system concepts. It provides the concepts of Computer Architecture and Organization which focuses on register transfers, micro-operations and computer arithmetic concepts. Operating Systems covers the basic operating system abstractions, mechanisms, and their implementations. The learner of this course can choose his/her carrier as system architect or as system programmer.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30585. 1 Analyze the fundamentals of computer organization in designing a system.

A30585.2 Apply the concepts of programming language to solve system problems.

A30585.3 Make use of the Operating Systems design structure and its services for system programming.

A30585.4 Develop Process Scheduling algorithms and Inter-Process Communication systems for resource management.

A30585.5 Classify memory management techniques and virtual memory mechanisms for apt implementations.

3. Course Syllabus

UNIT-I

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input/output and interrupt, complete computer description, design of basic computer.

UNIT-II

Programming the Basic Computer: Introduction, machine language, assembly language, the assembler, programming arithmetic and logic operations.

UNIT-III

Operating Systems: Introduction, What operating systems do, operating system -structure, operations, services, user operating system interface, system calls, types of system calls.

UNIT-IV

Process Management: Process concept, process scheduling, scheduling criteria, scheduling algorithms, operations on processes, inter process communication, examples of IPC systems, process synchronization, critical section problem, semaphores, and monitors.

UNIT-V

Memory Management: Main memory-background, swapping, contiguous memory allocation, segmentation, paging, virtual memory-background, demand paging, page replacement, allocation of frames.

Deadlocks: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

4. Books and Materials

Text Book(s)

1. M. Morris Mano, *Computer system architecture*, Pearson Education, 5th edition, 2016.

Reference Book(s)

1. Willam Stallings, *Computer Organization and Architecture Designing for Performance*, Pearson, PHI, 6th edition, 2010.
2. Silberschatz, Galvin and Gagne, *Operating System Concepts*, 9th edition, 2013, Wiley India edition.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30586 – FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides the insight of basic Artificial Intelligence concepts along with fundamentals of machine learning, deep learning and neural networks. It covers math-heavy topics, such as regression and classification illustrated by Python examples. In addition, it also focuses on AI with search techniques and machine learning types. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30586.1 Analyze different fields in which AI is applied.

A30586.2 Apply suitable search strategies in finding better solution for a given problem.

A30586.3 Identify linear regression with single and multiple variables.

A30586.4 Perform predictive analysis using decision trees and random forest classifier.

A30586.5 Implement deep learning neural network models with Tensor Flow.

3. Course Syllabus

UNIT-I

Principles of Artificial Intelligence: Introduction, fields and applications of artificial intelligence, AI tools and learning models, the role of python in artificial intelligence

UNIT-II

AI With Search Techniques: Introduction, heuristics, uniformed and informed search strategies, path finding with the A* Algorithm.

UNIT-III

Regression: Introduction, linear regression with one variable, linear regression with multiple variables, polynomial and support vector regression.

UNIT-IV

Classification: The fundamentals of classification, classification with support vector machines, introduction to decision trees, random forest classifier.

UNIT-V

Machine Learning with Neural Networks: Machine learning types, tensor flow for python, introduction to neural networks, deep learning.

4. Books and Materials

Text Book(s)

1. Zsolt Nagy, *Artificial Intelligence and Machine Learning Fundamentals*, Packt publishing, 2018.

Reference Book(s)

1. Dr. Dheeraj Mehrotra, *Basics of Artificial Intelligence & Machine Learning*, Notion Press, 1st edition 2019.
2. Neil Wilkins, *Artificial Intelligence: An Essential Beginner's Guide to AI, Machine Learning, Neural Networks, Deep Learning*, Bravex Publications, 2019.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30587 – FUNDAMENTALS OF WEB TECHNOLOGIES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course makes the students to practice the principles of creating an effective web page and learn the language of the web with HTML and CSS. It Develop skills in analysing the usability of a web site and how to plan and conduct user research related to web usability.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30587.1 Apply the principles of creating an effective web page.

A30587.2 Apply the elements of design with regard to the web.

A30587.3 Create the language of the web: HTML and CSS.

A30587.4 Develop skills in analyzing the usability of a web site.

A30587.5 Understand how to plan and conduct user related to web usability.

3. Course Syllabus

UNIT-I

BASICS IN WEB DESIGN: Brief History of Internet, What is World Wide Web, Why create a web site and Standards, Public demand requirement.

UNIT-II

WEB DESIGN PRINCIPLES: Basic principles involved in developing a web site, Planning Process, rules of web designing, Page design, Home Page Layout and Design Concept.

UNIT-III

INTRODUCTION TO HTML: Introduction to HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags and Heading-Paragraphs

UNIT-IV

INTRODUCTION TO ELEMENTS OF HTML: Working with Text, Working with Lists, Tables and Frames Working with Hyperlinks, Images and Multimedia, Forms and controls.

UNIT-V

INTRODUCTION TO CASCADING STYLE SHEETS: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts) and block elements and objects, Lists and Tables CSS Id and Class, Box Model.

4. Books and Materials

Text Book(s)

1. Deitel and Deitel and Nieto, *Internet and World Wide Web - How to Program*, Prentice Hall, 5th Edition, 2015.

Reference Book(s)

1. Chris Bates, *Web Programming – Building Intranet Applications*, 3r Edition, Wiley Publications, 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30588 – INTRODUCTION TO JAVA PROGRAMMING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course makes the students to study the syntax, semantics and features of Java Programming Language. Learn the method of creating Multi-threaded programs and handle exceptions. Learn Java features to create GUI applications & perform event handling exceptions.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30588.1 Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism.

A30588.2 Demonstrate an ability to design and develop java programs, analyze, and interpretobject oriented data and report results.

A30588.3 Demonstrate an ability to design an object oriented system, swing components andmultithreaded processes as per needs and specifications.

A30588.4 Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets programs.

A30588.5 Demonstrate skills to use latest object oriented programming language and software toanalyze OOP problems.

A30588.6 Develop confidence for self-education and ability for life-long learning needed foradvanced java technologies.

3. Course Syllabus

UNIT-I

The History and Evolution of Java:

Java‟s Lineage, The Creation of java, how java changed the internet, **Java's magic:** The byte code, **Servlets:** java on the server side, java Buzzwords, Evolution of java.

An Overview of Java:

Object Oriented Programming, Two control statements, Using blocks of codes, Lexical issues,The java class Libraries.

Data Types, Arrays and Variables:

UNIT-II

Operators:

Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logic operators, The assignment operator, The ? Operator, Operator Precedence, Using Parentheses.

Control Statements:
Java‟s selection Statements, Iteration statements, Jump Statements.
Introducing Classes:
Class Fundamentals, Declaring Objects, Assuming Object reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The Finalize() method, A
Stack class. Overloading Methods, Using Object as Parameter, Argument Passing, Returning Objects, Recursion, Introducing Access control, Understanding static, Introducing Nested and Inner classes, Exploring the String class, Using Command line Arguments, Varargs: variable- Length Arguments.
UNIT-III
Inheritance:
Basics, Using super, creating a multi-level hierarchy, when constructors are executed, method overriding, dynamic method dispatch, using abstract class, using final with inheritance, the objectclass.
Packages and Interfaces: Packages, Access protection, Importing Packages, Interfaces, Default Interfaces, Default interface methods, Use static methods in an Interface, Final thoughts on Packages and interfaces.
Exception Handling: Exception handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java Built-in Exceptions, Creating your own exception subclasses, Chained Exceptions, Three Recently added Exceptions features, Using Exceptions.
UNIT-IV
Multithreaded Programming:
The java Thread Model, The main thread , Creating Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Interthread Communication, Suspending, resuming and stopping threads, Obtaining a thread state, Using Multithreading.
Input and Output operations:
I/O basics, Reading Console input, Writing console Output, The PrintWriter class, Reading andwriting files, Automatically closing a file.
UNIT-V
Introducing Swing: The Origins of Swing, Two Key Swing Features, Components and Containers, The Swing Packages, A Simple Swing Application, Event Handling, Create a SwingApplet.
Exploring Swing: JLabel and ImageIcon, JTextField, The Swing Buttons, JScrollPane, JList,JComboBox, JTree, JTable.

4. Books and Materials

Text Book(s)

1. ”Java The Complete Reference”, Herbert Schildt, MC GRAW HILL Education, 9th Edition,2016.

Reference Book(s)

1. “Programming with Java” T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan PearsonEdition.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33188-AGILE METHODOLOGIES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provide the students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software, good understanding of software design and a set of software technologies and APIs, to do a detailed examination and demonstration of Agile development and testing techniques, understand the benefits and pitfalls of working in an Agile team and Agile development and testing.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Realize the importance of interacting with business stakeholders in determining the requirements for a software system
2. Perform iterative software development processes: how to plan them, how to execute them.
3. Point out the impact of social aspects on software development success.
4. Develop techniques and tools for improving team collaboration and software quality.
5. Perform Software process improvement as an ongoing task for development teams.
6. Show how agile approaches can be scaled up to the enterprise level.

3. Course Syllabus

UNIT I AGILE METHODOLOGY

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT

Agile Information Systems – Agile Decision Making - Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development

4. Books and Materials

Text Book(s)

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results‖, Prentice Hall, 2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science‖, Springer, 2009.

Reference Book(s)

1. Craig Larman, —Agile and Iterative Development: A Manager_s Guide‖, Addison-Wesley, 2004.
2. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management‖, Butterworth-Heinemann, 2007.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33148 - INTRODUCTION TO INDUSTRY 4.0 AND IIOT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

This course provides sensors and actuators in IoT and connectivity technologies like Zigbee, Bluetooth, and RFID, emphasizing network QoS and data protocols such as MQTT and CoAP. It covers Industry 4.0's history, impact, and lean production systems, along with cyber-physical systems, AI, big data, and augmented reality. Students learn about IIoT business models and opportunities, IoT/IIoT reference architectures, and fog computing's role in industrial analytics. The course also includes R programming basics and data management technologies.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

1) Understand various IoT connectivity technologies and their protocols.
2) Analyze the impact and implementation of Industry 4.0 and lean production systems.
3) Evaluate the role of augmented reality, virtual reality, AI, and big data in CPS.
4) Evaluate the feasibility and appropriateness of different business models for IIoT.
5) Apply fog computing architectures to industrial analytics use cases.

3. Course Syllabus

UNIT-1

Sensors – Definition, Characteristics, Classification, Actuators - Definition, Classification, IoT Connectivity Technologies – IEEE 802.15.4, Zigbee, 6LoWPAN, Wireless HART, Z-Wave, Bluetooth, NFC, RFID, IoT Network QoS, IoT Data Protocols – MQTT, CoAP, AMQP, XMPP.

UNIT-2

Introduction to Industry 4.0, Industry Revolution, the Fourth Revolution, Megatrends, LEAN Production Systems – 7 Types of wastes, overview of Impacts and Implementation of Lean, Smart and Connected Business Perspective.

UNIT-3

Cyber Physical Systems – Features, Applications, 5C Architecture, Challenges, difference with embedded systems, Collaborative Platform, Augmented Reality and Virtual Reality, Artificial Intelligence, Big Data and Advanced Analysis.

UNIT-4

Industrial Internet Systems, Business Models of IoT, Business models of IIoT, Business opportunities in IIoT, Categorization of business models in IIoT, Reference architecture of IoT, Reference Architecture of IIoT.

UNIT-5

Fog Computing in IIoT – Fog Computing Architecture for IIoT, Industrial Analytics, Use Cases, IIoT Solutions using Fog, R Programing – Variables, Operators, Data Types, Data Management – Technologies, Process, Sources, Acquisition, Storage.

4. Books and Materials

Text Book(s)

1) S. Misra, A. Mukherjee, and A. Roy, *Introduction to IoT.* Cambridge University Press, 2021 edition.
2) S. Misra, C. Roy, and A. Mukherjee, *Introduction to Industrial Internet of Things and Industry 4.0,* CRC Press,1st edition 2021

Online Learning Resources:

1) https://archive.nptel.ac.in/courses/106/105/106105195/

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSESTRUCTURE

A33149– Cloud Computing

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

5. Course Description

Course Overview

This course provides a comprehensive introduction to Cloud Computing, focusing on its architecture, service models, resource management, security, and emerging trends. It covers fundamental concepts and advanced topics, offering practical insights into managing and utilizing cloud resources effectively. Students will explore various cloud deployment models, service types, and security measures while gaining expertise in cutting-edge technologies such as serverless computing and Cloud-Fog-Edge analytics.

Course Pre/corequisites

- Basic Knowledge of Computer Science
- Introduction to Networking
- Basic Understanding of Operating Systems
- Fundamentals of Databases

6. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A33140.1 Understand the fundamental concepts of Cloud Computing, including service and deployment models, and how they differ from traditional IT infrastructures.

A33140.2 Demonstrate knowledge of service management and resource allocation techniques in the cloud, with the ability to manage scalability, elasticity, and performance monitoring effectively.

A33140.3 Analyze and address security challenges in Cloud Computing, including Identity and Access Management (IAM), data privacy, and legal compliance. Compare and evaluate open-source and commercial cloud platforms.

A33140.4 Evaluate emerging cloud computing trends such as Fog and Edge Computing, and understand their applications in real-time data processing, VM resource management, and cloud-enabled analytics.

A33140.5 Prepare Gain expertise in server less computing and the Function as a Service (FaaS) model, while exploring case studies, cloud analytics and future advancements in cloud technologies such as AI and edge computing.

7. Course Syllabus

UNIT-I

Introduction to Cloud Computing and Architecture:

Introduction to Cloud Computing: Definition, Evolution of Cloud Computing, Characteristics, Advantages, and Disadvantage, Cloud Service Models (IaaS, PaaS, SaaS), Deployment Models (Public, Private, Hybrid, and Community Clouds)

Cloud Computing Architecture: Cloud Components: Client, Datacenter, Distributed Servers Virtualization in Cloud Cloud Architecture Layers Cloud Computing Reference Architecture.

UNIT-II

Cloud Service and Resource Management

Service Management in Cloud Computing: Service Models in Cloud Computing (IaaS, PaaS, SaaS), Cloud Service Providers, SLA (Service Level Agreements) in Cloud

Data and Resource Management in Cloud Computing: Data Storage in Cloud, Storage as a Service Resource Allocation Techniques, Scalability and Elasticity in Cloud, Load Balancing, and Auto-scaling in Cloud.

UNIT-III

Cloud Security and Platforms

Cloud Security: Security Issues and Challenges in Cloud, Identity and Access Management (IAM), Data Privacy and Protection in Cloud, Legal and Compliance Aspects

Open Source and Commercial Clouds: Overview of Popular Cloud Platforms (AWS, Google Cloud, Azure), Open Source Cloud Platforms (OpenStack, CloudStack), Introduction to Cloud Simulators (CloudSim).

UNIT-IV

Advanced Cloud Concepts and Trends

Research Trends in Cloud Computing: Current Trends and Challenges in Cloud, Introduction to Fog Computing and Edge Computing, and Cloud-Fog-Edge Continuum

Virtual Machine Resource Allocation and Monitoring: VM Scheduling and Resource Allocation, Techniques for Resource Monitoring and Management, Containerization and Docker.

UNIT-V

Serverless Computing and Future Trends

Cloud-Fog-Edge Enabled Analytics: Cloud Analytics and Big Data Processing in Cloud-Fog-Edge Environments, Real-time Data Processing and IoT Integration

Serverless Computing and FaaS (Function as a Service): Introduction to Serverless Architectures, Function as a Service Model (FaaS), Event-driven Architectures in Cloud

Case Studies and Recent Advancements: Case Studies of Cloud Implementations, Latest Trends and Advancements in Cloud Technologies.

8. BooksandMaterials **Text**

Books:

1. *Thomas Erl, Zaigham Mahmood, and Ricardo P. W. Da Silva, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013*.
2. Michael J. Kavis, Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS), Wiley, 2014.
3. Nikos Antonopoulos and Lee Gillam (Editors), Cloud Computing: Principles, Systems and Applications, Springer, 2010.
4. Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Morgan Kaufmann, 2013.

ReferenceBooks:

3. David S. Linthicum, Cloud Computing and SOA Convergence in Your Enterprise: A Step-by Step Guide, Addison-Wesley, 2009.
4. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Media, 2009.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33150- INTRODUCTION TO DATA SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of concepts, techniques and tools they need to deal with various facets of data science, practice, including data collection and integration, basic types of data and basic statistics. Identify the importance of data reduction and data visualization techniques

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Understand basic terms what Statistical Inference means.
2. Identify probability distributions commonly used as foundations for statistical modelling. Fit a model to data
3. describe the data using various statistical measures
4. utilize R elements for data handling
5. perform data reduction and apply visualization techniques.

3. Course Syllabus

UNIT - I

Introduction: Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication - Current landscape of perspectives - Statistical Inference - populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, REnvironment Setup, Programming with R, Basic Data Types.

UNIT - II

Data Types & Statistical Description

Types of Data: Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes,Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT - III

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting, Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class. Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

UNIT - IV

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements. Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.

UNIT - V

Data Reduction: Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation. Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

4. Books and Materials

TEXT BOOKS:

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
2. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
3. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
3. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
4. Paul Teetor, "R Cookbook", O'Reilly, 2011

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33545- AD HOC AND WIRELESS SENSOR NETWORKS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of Ad-hoc & Sensor Networks, various fundamental and emerging protocols of all layers, issues pertaining to major obstacles in establishment and efficient management of Ad-hoc and sensor networks, nature and applications of Ad-hoc and sensor networks, various security practices and protocols of Ad-hoc and Sensor Networks.

Course Pre/Corequisites

Computer networking concepts

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Identify different issues in wireless ad hoc and sensor networks.
2. To analyze protocols developed for ad hoc and sensor networks.
3. To identify and address the security threats in ad hoc and sensor networks.
4. Establish a Sensor network environment for different type of applications.

3. Course Syllabus

UNIT I -MAC & TCP IN AD HOC NETWORKS

Fundamentals of WLANs, IEEE 802.11 Architecture, Self-configuration and Auto configuration, Issues in Ad-Hoc Wireless Networks, MAC Protocols for Ad-Hoc Wireless Networks,Contention Based Protocols-TCP over Ad-Hoc networks, TCP protocol overview-TCP and MANETs, solutions for TCP over Ad-Hoc Networks.

UNIT II-ROUTING IN AD HOC NETWORKS

Routing in Ad-Hoc Networks, Introduction, Topology based versus Position based Approaches, Proactive, Reactive, Hybrid Routing Approach, Principles and issues ,Location services,DREAM ,Quorums based location service, Grid–Forwarding strategies, Greedy packetforwarding ,Restricted directional flooding, Hierarchical Routing, Issues and Challenges inproviding QoS.

UNIT III-MAC, ROUTING & QOS IN WIRELESS SENSOR NETWORKS

Introduction, Architecture, Single node architecture, Sensor network design considerations ,Energy Efficient Design principles for WSNs, Protocols for WSN, Physical Layer : Transceiver Design considerations, MAC Layer Protocols ,IEEE802.15.4 Zigbee, Link Layer and Error Control issues-Routing Protocols, Mobile Nodes and Mobile Robots, Data Centric & ContentionBased Networking ,Transport Protocols & QOS, Congestion Control issues ,Application Layersupport.

UNIT IV -SENSOR MANAGEMENT

Sensor Management, Topology Control Protocols and Sensing Mode Selection Protocols, Time synchronization, Localization and positioning, Operating systems and Sensor Networkprogramming, Sensor Network Simulators.

UNIT V -SECURITY IN AD HOC AND SENSOR NETWORKS

Security in Ad-Hoc and Sensor networks, Key Distribution and Management, Software based Anti-

tamper techniques, water marking techniques, Defence against routing attacks, Secure Adhoc routing protocols, Broadcast authentication WSN protocols, TESLA, Biba, Sensor NetworkSecurity Protocols, SPINS.

4. Books and Materials

TEXT BOOKS:

1) Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.
2) Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011.
3) C.Siva Ram,Murthy and B.S.Manoj, “Ad Hoc Wireless Networks–Architectures and Protocols”, Pearson Education, 2004.

REFERENCE BOOKS:

1) C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2002.
2) Erdal Çayırcı , Chunming Rong, “Security in Wireless Ad Hoc and Sensor Networks”, John Wiley and Sons, 2009

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33546- ETHICS IN INFORMATION TECHNOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge about professional ethics and understand Organizational culture and Climate, impact of IT Profession, software development Cyber laws and regulations in society. Familiarize with standards, policies, procedures and controls for Information Security Management.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. understand professional ethics and organizational culture conduct in information technology.
2. choose various leadership styles and the suitability for the specific organization
3. identify the possible Computer crimes and the rules and regulations for protection.
4. describe the various types of IPR and the procedures for obtaining IPR
5. explain the various types of Social Networking and issues
6. relate to the different national and international organizational models with intellectual ability.

3. Course Syllabus

UNIT 1: Overview of Professional Ethics

Professional Ethics - Big Picture View - Organizational Culture and Climate- Senses of 'EngineeringEthics- Leadership theories: Transactional, Transformational, charismatic leadership, situationalleadership- Participative style of management- Engineers as Managers - Concept of Continuousimprovement- PDCA Cycle- Suggestion Schemes and Quality circles

UNIT 2: Cyber-Crimes and Cyber Laws

Ethics for IT Workers and IT Users-IT Professionals-IT professional malpractice-IT , IT Act cyber laws - Information Technology Act, 2000 ("IT Act") - Digital Signature - Confidentiality, Integrity and Authenticity (CIA)

UNIT 3: Intellectual Property Rights

Key Issues-Intellectual Property - Software CopyRights- Patents- Patentable Software related Products- IPR Procedures- Patent Application, Publication, examination, awarding

UNIT 4: Software Development and Information Technology

Strategies to Engineer Quality Software-Key Issues in Software Development- The impact of IT onthe Standard of Living and Productivity -Industry 4.0 standards and applications in areas like Food,Water, Energy and Health care

UNIT 5: Social Networking, Ethics of Information Technology OrganizationsSocial Networking Web Site - Business Applications of Online Social Networking-Social NetworkingEthical IssuesOnline Virtual Worlds- Key ethical issues for Organizations- Outsourcing-WhistleBlowing-Green Computing-ICT

Industry Code for Conduct.

4. Books and Materials

Text Book:

1. George Reynolds, “Ethics in Information Technology”, CENGAGE Learning Fourth Edition, 2012. ISBN: 9788131518755, 8131518752

Reference Books:

1. Richard A. Spinello, “Case Studies in Information Technology Ethics”, Prentice Hall, Second Edition, 2003. ISBN:978-0130991508.
2. Sara Base, “A Gift of Fire:social, legal, and ethical issues for computing and the Internet”, Prentice Hall, Second Edition, 2008, ISBN: 978-0132492676
3. IT Act https://indiacode.nic.in/bitstream/123456789/1999/3/A2000-21.pdf
4. IPR in India Laws and Procedures: https://www.india-briefing.com/news/intellectualproperty-rights-india-laws-procedures-registration-14312.html/
5. Industry 4.0 the Fourth Industrial Revolution https://www.i-scoop.eu/industry-4-0/
6. ISMS Policy Oil India https://oilweb.oilindia.in/policy/Information_Security_Polciy_2013.pdf

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33547 - DRONE TECHNOLOGIES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge about the basics of drone concepts, fundaments of design, fabrication and programming of drone, flying and operation of drone, various applications of drone, safety risks and guidelines of fly safely.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Analyze the impact of drone technology on various businesses.
2. Compare and contrast different methods of programming a drone.
3. Identify the various flight controls and management tools used in drone operation.
4. Utilize drones effectively in insurance inspections and claim assessments.
5. Design and implement safety protocols for operating drones in various scenarios.

3. Course Syllabus

UNIT I-INTRODUCTION TO DRONE TECHNOLOGY

Drone Concept - Vocabulary Terminology- History of drone - Types of current generation of drones based on their method of propulsion- Drone technology impact on the businesses- Drone business through entrepreneurship- Opportunities/applications for entrepreneurship and employability

UNIT II-DRONE DESIGN, FABRICATION AND PROGRAMMING

Classifications of the UAV -Overview of the main drone parts- Technical characteristics of the parts - Function of the component parts -Assembling a drone- The energy sources- Level of autonomy- Drones configurations -The methods of programming drone- Download program - Install program on computer- Running Programs- Multi rotor stabilization- Flight modes -Wi-Fi connection.

UNIT III-DRONE FLYING AND OPERATION

Concept of operation for drone -Flight modes- Operate a small drone in a controlled environment- Drone controls Flight operations –management tool –Sensors-Onboard storage capacity -Removable storage devices- Linked mobile devices and applications

UNIT IV-DRONE COMMERCIAL APPLICATIONS

Choosing a drone based on the application -Drones in the insurance sector- Drones in delivering mail, parcels and other cargo- Drones in agriculture- Drones in inspection of transmission lines and power distribution -Drones in filming and panoramic picturing

UNIT V-FUTURE DRONES AND SAFETY

The safety risks- Guidelines to fly safely -Specific aviation regulation and standardization- Drone license- Miniaturization of drones- Increasing autonomy of drones -The use of drones in swarms

4. Books and Materials

Text Book:

Editor(s):Sachi Nandan Mohanty, J.V.R. Ravindra, G. Surya Narayana, Chinmaya Ranjan Pattnaik, Y. Mohamed Sirajudeen

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33548 -COMPUTER COMMUNICATION NETWORKS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of data communication and networking, comprehend the layering architecture of OSI reference model and TCP/IP protocol suite, different protocols associated with each layers.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Understand the components and layered architecture of communication networks
2. Identify the protocols and services of data link layer.
3. Analyze the different LAN technologies for building networks.
4. Describe the wireless WAN technologies for wireless transmission.
5. Design network model and determine the routing protocols for different applications.
6. Construct communication networks for supporting different applications

3. Course Syllabus

Unit I :Physical Layer

Uses of Computer Networks – Network Hardware – Network Software – Reference Models – Example Networks – Example Data Communication Services – Network Standardization –The Theoretical Basis for Data Communication – Transmission Media – WirelessTransmission – The Telephone System – Narrow band ISDN , Broadband ISDN and ATM –Cellular Radio – Communication Satellites

Unit II :Data Link Layer

Data Link Layer Design Issues – Error Detection and Correction – Elementary Data Link Protocols – Sliding Window Protocols – Protocol Specification and Verification – Example Data Link Protocols – The Channel Allocation Problem – Multiple Access Protocols – IEEE Standard 802 for LANS and MANS – Bridges – High Speed LANS – Satellite Networks

Unit III :Network Layer

Network Layer Design Issues – Routing Algorithms – Congestion Control Algorithms –Internetworking – The Network Layer in the Internet – The Network Layer in ATM Networks Transport LayerTransport Service – Elements of Transport Protocols – A simple transport protocol – TheInternet Transport Protocols (TCP and UDP) – The ATM AAL Layer Protocols – Performance Issues

Unit IV : Application Layer

Network Security – Domain Name System (DNS) – Simple Network Management Protocol (SNMP) – Electronic Mail – Usenet News – The World Wide Web – Multimedia

Unit V :ATM Networks

Introduction - ATM – Historical perspective – protocol architecture – logical connectives – cells – transmission of ATM cells – SDH – SONET – Switches. ATM Protocol – Connection setup – routing , switching

4. Books and Materials

Text Book(s)

1. Andrew S.Tanenbaum , Computer Networks, Prentice Hall of India ,1997
2. Rainer Handel, Manfred N.Huber, Stefan Schroder, "ATM Networks", Addison Wesley, 1999.

Reference Book(s)

1. W.Stallings ,Data and Computer Communication, Prentice Hall of India ,New Delhi,
Fourth Edition ,1996
2. F.Halsai ,Data Communications, Computer Networks and Open Systems, Addison Wesley Publications
, Third Edition ,1994.
3. Peterson, Computer Networks, Second edition.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30081 – RESEARCH METHODOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of this course is to have a general understanding of statistics as applicable to business and its use in areas of engineering research. The Course addresses the methods of research with an emphasis on various stages that are necessary to obtain and process information to enable well informed decision-making. It allows the students to grasp and comprehend the methods and techniques used in research and provide with the knowledge and skill to undertake research.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30081.1 Interpret the importance of literature survey to identify the research problem.

A30081.2 Develop suitable research methodologies to conduct engineering research.

A30081.3 Apply the principles of research to gather the required data from various sources.

A30081.4 Evaluate the gathered data by using appropriate statistical techniques.

A30081.5 Prepare and present the research report effectively with the help of visual aids.

3. Course Syllabus

UNIT-I

Research Methodology: Objectives and motivation of research, types of research, research approaches, significance of research, research methods verses methodology, research and scientific method, important of research methodology, research process, criteria of good research, problems encountered by researchers in India, benefits to the society in general, defining the research problem: definition of research problem, problem formulation, necessity of defining the problem, technique involved in defining a problem.

UNIT-II

Literature Survey: Importance of literature survey, sources of information, assessment of quality of journals and articles, information through internet. Literature review: need of review, guidelines for review, record of research review.

UNIT-III

Research Design: Meaning of research design, need of research design, feature of a good design important concepts related to research design, different research designs, basic principles of experimental design, developing a research plan, design of experimental set-up, use of standards and codes.

UNIT-IV

Data Collection: Collection of primary data, secondary data, data organization, methods of data grouping, diagrammatic representation of data, graphic representation of data. Sample designed for sampling, some important sampling definitions, estimation of population, role of statistics for data analysis, parametric v/s non-parametric methods, descriptive statistics, measures of central tendency and dispersion, hypothesis testing, use of statistical software. Data analysis: deterministic and random data, uncertainty analysis, tests for significance: chi-square, student's t-test, regression modeling, direct and interaction effects, anova, F-test, time series analysis, autocorrelation and autoregressive modeling.

UNIT-V

Research Report Writing: Format of the research report, synopsis, dissertation, thesis its differentiation, references/bibliography/webliography, technical paper writing/journal report writing, making presentation, use of visual aids. Research proposal preparation: writing a research proposal and research report, writing research grant proposal.

4. Books and Materials

Text Book(s)

1. O.R Krishnaswami and M. Ranganatham, *Methodology of Research in Social Sciences,* Mumbai: Himalaya Publishing House, ISBN 81-8318-454-5, 2005.

Reference Book(s)

1. C.R Kothari, *Research Methodology, Methods & Technique*; Hyderabad: New Age International Publishers, 2004.
2. R. Ganesan, *Research Methodology for Engineers*, New Delhi: MJP Publishers, 2011.
3. Ratan Khananabis and SuvasisSabha, *Research Methodology*, Universities Press, Hyderabad, 2015.
4. Y. P. Agarwal, *Statistical Methods: Concepts, Application and Computation*, Sterling Publications Pvt., Ltd., New Delhi, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30082 – INTELLECTUAL PROPERTY RIGHTS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of the course is to have a general understanding of the basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Issues related to Patents. The Course addresses the means of innovations with an emphasis on trade secret that are necessary to obtain IPR through protect their innovations. It also encourages the students to take up innovations and establish start-ups.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30082.1 Analyze ethical and professional issues which arise in the intellectual property law context.

A30082.2 Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.

A30082.3 Analyze the social impact of intellectual property law and policy.

A30082.4 Make use of copyrighted material so that it does not obstruct the progress of human knowledge.

A30082.5 Analyze IPR policies before filing patentable inventions and discoveries.

3. Course Syllabus

UNIT-I

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III

Law of Copy Rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: foundation of patent law, patent searching process, ownership rights and transfer.

UNIT-IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: misappropriation right of publicity, false advertising.

UNIT-V

New Developments of Intellectual Property: New developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

4. Books and Materials

Text Book(s)

1. K Bansal& P Bansal, *Fundamentals of Intellectual Property for Engineers,* BS Publications, ISBN: 9788178002774, 8178002779, Edition: 2013.

Reference Book(s)

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks Copyrights Patents and Trade Secrets*, 4th Edition, New Delhi: Cengage India, 2015, ISBN:9788131528976.
2. Prabuddha Ganguli, *Intellectual Property Rights– Unleashing the Knowledge Economy,* McGraw Hill Education; 1st Edition, 1st July 2017.
3. Integrating Intellectual Property Rights and Development Policy: *Report of the Commission on Intellectual Property Rights,* London September 2002 (web source: http://www.iprcommission.org/papers/pdfs/final_report/ciprfullfinal.pdf).

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30083 – NATIONAL SERVICE SCHEME

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The main objectives of National Service Scheme (NSS) are : understand the community in which they work, understand themselves in relation to their community, identify the needs and problems of the community and involve them in problem-solving, develop among themselves a sense of social and civic responsibility, utilize their knowledge in finding practical solutions to individual and community problems, develop competence required for group-living and sharing of responsibilities, gain skills in mobilizing community participation, acquire leadership qualities and democratic attitudes, develop capacity to meet emergencies and natural disasters and, practice national integration and social harmony

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30083.1 Classify the organizational structure of NSS and its activities.

A30083.2 Identify the methods of mobilization and importance of youth Leadership.

A30083.3 Develop a sense of social and civic responsibility and provide solutions to individual and community problems.

A30083.4 Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions.

A30083.5 Develop capacity to meet emergencies and natural disasters.

3. Course Syllabus

UNIT-I

Introduction and Basic Concepts of NSS - History, philosophy, aims & objectives of NSS, Emblem, flag, motto. Song, badge etc., Organizational structure, rules and responsibilities of various NSS functionaries.

UNIT-II

NSS Programmes and Activities - Concept of regular activities, special camping, Day Camps, basis of adoption of village/slums. Methodology of conducting Survey, financial pattern of the scheme, other youth prog. /schemes of Goal, coordination with different agencies, maintenance of the Diary.

UNIT-III

Understanding Youth - Definition, profile of youth, categories of youth, issues, challenges and opportunities for youth, youth as an agent of social change.

Importance and Role of Youth Leadership -Meaning and types of leadership, qualities of good leaders; traits of leadership, importance and rule of youth leadership.

UNIT-IV

Community Mobilization- Mapping of community stakeholders, designing the message in the context of the problem and the culture of the community, identifying methods of mobilization.

UNIT-V

Volunteerism and Shramdan: Indian Tradition of volunteerism, needs & importance of volunteerism, motivation and constraints of volunteerism, shramdan as a part of volunteerism.

4. Books and Materials

Reference Book(s)

1. Khwajala Ghulama Saiyidain, *National Service Scheme: A Report*, Published by Ministry of Education, Govt. of India, 1961.
2. N. F. Kaikobad, Krishan K. Kapil, *Training and consultancy needs in national service scheme*, Published by the Tata Institute of Social Sciences (TISS), 1971.
3. *National Service Scheme: guide-lines to project-masters*, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971.

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COURSE STRUCTURE
A30084 – YOGA

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Yoga is an invaluable gift of ancient Indian tradition. It embodies unity of mind and body; thought and action; restraint and fulfilment; harmony between man and nature and a holistic approach to health and well-being. Yoga is not about exercise but to discover the sense of oneness with ourselves, the world and Nature. By changing our lifestyle and creating consciousness, it can help us to deal with climate change. Stress and Depression have become silent killers. Yoga offers a solution to these ailments. Practicing Yoga helps fight stress and find peace. All you need is willingness to practice it.

Course Pre/corequisites

There is no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to do

A30084.1 Improve physical conditioning related to flexibility through participation in yoga.

A30084.2 Develop and maintain a personal yoga practice.

A30084.3 Recognize and apply the value and benefits of an on-going yoga practice.

A30084.4 Select asanas appropriate for personal needs.

A30084.5 Identify and apply relaxation techniques for stress reduction.

3. Course Syllabus

UNIT-I

Introduction of human body and its systems, definition of anatomy and physiology and importance in yogic practices, respiratory system, digestive system, endocrine system. Origin of yoga & its brief development, meaning of yoga & its importance, yoga as a science of art (yoga philosophy), meaning of meditation and its types and principles.

UNIT-II

Classification of yoga/types of yoga - hatha yoga, raja yoga, laya yoga, bhakti yoga, gyan yoga, karma yoga, asthang yoga.

UNIT-III

Classification of asanas and its mechanism, cultural asana (standing, sitting, supinline, praline position & topsy-turvy), meditative asana and relaxative asana, nervous system, circulatory system.

UNIT-IV

Introduction of Kriya, bandha and mudra, importance of KRIYA and its scientific approach, importance of BANDHA and its scientific approach, importance of MUDRA and its scientific approach.

UNIT-V

Effect of asanas on various systems, difference between asana and exercise, difference between pranayama and deep breathing and yogic diet.

4. Books and Materials

References:

1. Georg Feuerstein, *The Yoga Tradition: Its History, Literature, Philosophy and Practice*, New Delhi, Bhavana Books & Prints, 2002.
2. Joshi, K.S. *Yoga in daily life*, Delhi, Orient paper backs, 1985.
3. Taimni I.K, *The Science of Yoga (The Yoga Sutras of Patanjali)*, The Theosophical Publishing House, Adyar, 1961/1999.

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COURSE STRUCTURE

A30085 – DESIGN THINKING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course introduces design thinking and its application to developing new products, services, and the organization of businesses. Design thinking is a human-centric, interdisciplinary approach towards innovation. Design thinking as practiced in this course blends creative thinking and logical or rational thinking, and involves a process consisting of empathizing, ideating, and prototyping. Students will learn design principles, methodologies, and frameworks, and apply them through exercises and projects. The course is divided into four main aspects, all interconnected but which we also separately emphasize. They are: (1) design methodologies, (2) the "thing" to be designed (i.e., products, services, or the business itself, e.g. the business model),
(3) human attitudes and behaviors (towards the designs), and (4) design contexts.

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30085.1 Appreciate various design processes for creativity and innovation.

A30085.2 Develop design ideas through different techniques.

A30085.3 Identify the significance of reverse engineering about products.

A30085.4 Make use of design drawings to communicate ideas effectively.

A30085.5 Build organizations that support creative and innovative thinking.

3. Course Syllabus

UNIT-I

Introduction to design thinking, definition, why is design thinking important, how is design thinking different, process of design - introduction – product life cycle - design ethics, creativity, innovation and design, design process - creativity and innovation in design process - design limitation, preparing mind for innovation-the physics of innovation.

UNIT-II

Idea generation- The idea, generation process, mind mapping tool. Experimentation-What works, learning launch tool, strategic opportunities, creative people, creative organizations, ideas, and tools to help both people and organizations work more creatively.

UNIT-III

Creative thinking - generating design ideas - lateral thinking –analogies – brainstorming - mind mapping - national group technique – synectic's - development of work - analytical thinking - group activities recommended.

UNIT-IV

Reverse engineering - introduction - reverse engineering leads to new understanding about products -reasons for reverse engineering - reverse engineering process - step by step – case study.

UNIT-V

Basics of drawing to develop design ideas- introduction - many uses of drawing - communication through drawing – drawing basis – line - shape/ form – value – colour – texture –overview of drawing -practice using auto cad recommended.

4. Books and Materials

Text Book(s)

1. John.R.Karsnitz, Stephen O 'Brien and John P. Hutchinson, *Engineering Design*, Cengage learning (International edition) Second Edition, 2013.
2. Yousef Haikand Tamer M. Shahin, *Engineering Design Process*, Cengage Learning, Second Edition, 2011.

Reference Online Resources

1. https://courses.edx.org/register?course_id=coursev1%3AUQx%2BCORPINN1x%2B2T2020&enrollment_action=enroll&email_opt_in=false
2. https://www.coursera.org/programs/coursera-response-program-for-pcek-brht?collectionId=&productId=bfnQqUbbEeeMtBKozo_2UA&productType=course&showMiniModal=true
3. www.tutor2u.net/business/presentations/.../productlifecycle/default.html orhttps://www.mindtools.com/brainstm.html
4. https://www.quicksprout.com/.../how-to-reverse-engineer-your-competit www.vertabelo.com/blog/documentation/reverse-engineeringhttps://support.microsoft.com/en-us/kb/273814
5. https://support.google.com/docs/answer/179740?hl=en https://www.youtube.com/watch?v=2mjSDIBaUlMthevirtualinstructor.com/foreshortening.html
6. https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdfwww.bizfilings.com›Home › Marketing› Product Development
7. https://canvas.uw.edu/courses/1023376/assignments/syllabus

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COURSE STRUCTURE

A30086 – MANAGEMENT SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of this course is to provide the knowledge of Management in Success of Business. Further, students will be able to apply the Concepts, Theories, Principles of Management in various functional areas of an organization such as in Designing organization structures for managing the operations, Human Resource, Marketing and Production Departments. The student will able to evaluate cost and time of each business project by using PERT and CPM techniques and also formulate the new strategies that enhance competitive edge.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30086.1 Apply the concepts, theories, and principles of management in professional life.

A30086.2 Design suitable organization structure for managing the operations in the organization.

A30086.3 Apply principles of management to the various functional areas of an organization such as Human Resource, Marketing and Production.

A30086.4 Evaluate cost and time of each business project by using PERT and CPM techniques.

A30086.5 Formulate the new strategies that enhance competitive edge.

3. Course Syllabus

UNIT-I

Introduction to Management: Concept-Nature and importance of management, functions-evaluation of scientific management, modern management-motivation theories-leadership styles-decision making process-designing organization structure-principles and types of organization.

UNIT-II

Operations Management: Plant location and layout, methods of production, work-study- statistical quality control through control charts, objectives of inventory management, need for inventory control – EOQ & ABC analysis (simple problems)

Marketing Management: Meaning, nature, functions of marketing, marketing mix, channels of distribution - advertisement and sales promotion - marketing strategies - product life cycle.

UNIT-III

Human Resource Management: Significant and basic functions of HRM-Human Resource Planning (HRP), job evaluation, recruitment and selection, placement and induction-wage and salary administration, employee training and development – Methods - Performance appraisal - employee grievances - techniques of handling Grievances.

UNIT-IV

Strategic Management: Vision, mission, goals and strategy- corporate planning process-environmental scanning-SWOT analysis-Different steps in strategic formulation, implementation and evaluation.

Project Management: Network analysis-PERT, CPM, identifying critical path-probability-project cost analysis, project crashing.

UNIT-V

Contemporary Management Issues & Practices: Basic concepts of MIS-Materials Requirement Planning (MRP),Just-In-Time (JIT) system, Total Quality Management(TQM)-Six Sigma and Capability Maturity Models (CMM) evies, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing(BPO), business process re-engineering, bench marking, and balance score card.

4. Books and Materials

Text Book(s)

4. A.R Aryasri, *Management Science,* 4th edition, New Delhi: Tata McGraw Hill, 2013.

Reference Book(s)

1. Ashima B. Chhalill, P. Vijaya Kumar, N. AppaRaohalill, *Introduction to Management Science*, 1stedition, New Delhi: Cengaage, 2012.
2. Vijay Kumar & Apparo: *Introduction to Management Science*, New Delhi Cengage, 2011.

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COURSE STRUCTURE

A30087 – ENTREPRENEURSHIP DEVELOPMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

9. Course Description

Course Overview

The primary objective of this course is to provide common knowledge on the basics of entrepreneurship, risk and reward. Further, the course addresses on promotion and institutional support by various institutions, ways and means of project planning, feasibility studies, project proposal and report preparation and, also the role of angel investors in promotion and expansion of start-ups in India. It also encourages the student to take up local challenges and establish start-ups. Hence, students will be able to transform himself/herself from a job seeker to provider.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

10. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30087.1 Analyze the nature of entrepreneurship, risk and reward in modern business scenario.

A30087.2 Identify the business challenges and opportunities by various case studies.

A30087.3 Assess the promotion and institutional support by various agencies in India.

A30087.4 Evaluate the role of angel investors in promotion and expansion of start-ups in India.

A30087.5 Prepare effective and feasible project proposals and project reports.

11. Course Syllabus

UNIT-I

Introduction to Entrepreneurship: Introduction to entrepreneurship definition types of entrepreneur, entrepreneurial traits, Entrepreneur vs. Manager, Entrepreneur Vs Intrapreneur, Entrepreneurial decision process, Ethics and social responsibility of entrepreneurs, Opportunities for entrepreneurs in India and abroad. Creating and starting the venture, sources of new ideas, methods of generating ideas, creative problem solving, and product planning and development process.

UNIT-II

Business Plan: The business plan nature and scope of business plan, writing business plan, evaluating business plans, using and implementing business plans, Marketing plan, financial plan, the organizational plan and Launching formalities.

UNIT-III

The Financing & managing New Venture: Financing and managing the new venture, sources of capital, venture capital, angel investment, record keeping, recruitment, motivating and leading teams, financial controls, Marketing and sales controls, E-commerce, entrepreneurship and internet advertising.

UNIT-IV

The new Venture Expansion Strategies: New venture expansion strategies and issues, features and evaluation of joint ventures, acquisitions, mergers, franchising. Public issues, rights issues, bonus issues and stock splits. Choosing location and layout, Issues related to selection of layout.

UNIT-V

Production & Marketing Management: Production and Marketing Management: thrust of production management, selection of production techniques, plant utilization and maintenance, designing the work place, inventory control, material handling and quality control, Marketing functions, market segmentation, market research and channels of distribution, sales promotion and product pricing, global aspects of entrepreneurship.

12. Books and Materials

Text Books:

1. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management,* Sixth edition, Himalaya Publishing House, New Delhi, 2011.

Reference Books:

5. Poornima M Charantimath, *Entrepreneurship Development and Small Business Enterprises,* 2nd Edition, Pearson Education India: Bengaluru, August 2013.
6. S.S. Khanka, *Entrepreneurial Development*, 2nd Edition, S Chand Publishing: New Delhi, ISBN: **9788121918015**, 2014.
7. Robert D Hisrich, Michael P Peters and Dean A Shepherd, *Entrepreneurship*, 6th Edition, TATA McGraw-Hill: New Delhi, 2007.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30387-RAPID MANUFACTURING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course introduces the fundamental principles and technologies of **Rapid Manufacturing** (RM), which includes **Rapid Prototyping (RP)**, **Additive Manufacturing (AM)**, and other related techniques. The course aims to provide learners with an understanding of how these technologies can drastically reduce time-to-market, improve product customization, and enable complex geometries that are difficult to achieve using traditional manufacturing methods

Course Pre/corequisites

Manufacturing Technology

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30387.1: Understanding of Rapid Manufacturing Technologies.
A30387.2 Familiarity with reverse engineering Processes.
A30387.3 Knowledge on Photo Polymerization Techniques
A30387.4: Rapid Tooling and Its Applications
A30387.5: Exploration of Emerging Technologies and Trends.

3. Course Syllabus

Unit-I

Introduction to Rapid Manufacturing: Additive Manufacturing, Additive Manufacturing Applications, Rapid Prototyping, Rapid tooling, Classification of Additive manufacturing, Product Development Process, Design for Modularity, Design for Manufacturing guidelines, Design for Assembly, Subtractive versus Rapid Manufacturing.

Unit-II

Reverse Engineering: Reverse Engineering Process, 3D Scanning Process, Reverse Engineering Hardware, Optical Techniques, Transitive Techniques, Co-ordinate Measuring Machine

Unit-III

Polymerization processes: Photo polymerization, photo polymerization materials, Stereolithographic Process, Powder based processes, Extrusion based processes, Sheet Stacking processes.

Unit-IV

3D printing processes: 3D printing processes Technical challenges, Dropet formation technologies, Priniting Process Modeling, Beam Deposition processes, Materials in Rapid Manufacturing.

Unit-V

Post-processing and costing in RM: Post-processing concerns, Product costing for Rapid, Rapid Product Development, CAD/CAM, Rapid Product Development, CAE and CIM, Rapid Product Development, Technomatix, Plant Simulation, Rapid Manufactiuring, case studies.

4. Books and Materials

1. Kamrani, A.K. and Nasr, E.A., 2010. Engineering design and rapid prototyping. Springer Science & Business Media.
2. Gebhardt, A., 2011. Understanding additive manufacturing.
3. Gibson, I., Rosen, D.W. and Stucker, B., 2014. Additive manufacturing technologies (Vol. 17). New York: Springer.
4. Hopkinson, N., Hague, R. and Dickens, P. eds., 2006. Rapid manufacturing: an industrial revolution for the digital age. John Wiley & Sons.
5. Pham, D. and Dimov, S.S., 2012. Rapid manufacturing: the technologies and applications of rapid prototyping and rapid tooling. Springer Science & Business Media.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33150-ETHICAL HACKING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

COURSE DESCRIPTION:

The objective of the course is to present an introduction to Ethical techniques with an emphasis on how to organize, maintain and secure the data - efficiently, and effectively.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO1. Describe the fundamental topics of hacking and network connectivity.
CO2. Implement the tools and techniques of Ethical hacking.
CO3. Learn the privacy, design and secure operations using cryptographic algorithms.
CO4. Apply the security and integrity tools in the cryptography system
CO5. Improving the secure and network systems.

SYLLABUS

UNIT I : INTRODUCTION TO ETHICAL HACKING

Introduction to ethical hacking. Fundamentals of computer networking. TCP/IP protocol stack, IP addressing and routing, TCP and UDP, IP subnets, and Routing protocols, types IP version 6.

UNIT II: ATTACKER AND VICTIM SYSTEM

Installation of attacker and victim system, Information gathering using advanced google search,archive.org, netcraft, whois, host, dig, dnsenum and NMAP tool**.** Vulnerability scanning using NMAP, Vulnerability scanning using NMAP and Nessus. Creating a secure hacking environment.

UNIT III : SYSTEM HACKING

Introduction, System Hacking password cracking, privilege escalation, application execution. Malware and Virus. ARP spoofing and MAC attack. Introduction to cryptography, private-key encryption, public-key encryption. Cryptographic hash functions, digital signature and certificate, applications. Steganography, biometric authentication, network-based attacks.

UNIT IV :DNS AND EMAIL SECURITY.

Introduction, Packet sniffing using Wireshark and burp suite, password attack using burp suite.Social engineering attacks and Denial of service attacks. Elements of hardware security: side-channel attacks, physical inclinable functions, hardware trojans.

UNIT V :SECURE BOOT MECHANISMS

Introduction,Different types of attacks using Metasploit framework: password cracking, privilege escalation, remote code execution, etc.Attack on web servers: password attack, SQL injection,Case studies: various attacks scenarios and their remedies.

TEXTBOOKS:

1. Data and Computer Communications -- W. Stallings.
2. Introduction to Computer Networks and Cybersecurity -- C-H. Wu and J. D. Irwin
3. Cryptography and Network Security: Principles and Practice -- W. Stallings

Reference Books:

1. Data Communication and Networking -- B. A. Forouzan
2. TCP/IP Protocol Suite -- B. A. Forouzan
3. UNIX Network Programming -- W. R. Stallings

Online Learning Resources:

1) Ethical Hacking Professional Certificate | NPTEL-12 weeks course

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33088 – E-BUSINESS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. COURSE DESCRIPTION

- This course is to introduce concepts, tools and approaches to electronic business to the undergraduate students.
- This subject will help the students to develop skills to manage businesses in the digital world.

2. COURSE OUTCOMES (COs)

After completion of the course, the learner will be able to:

CO1: Understand the fundamentals of e-business, including business models, information systems, and stakeholder connections to leverage technology for organizational success.

CO2: Analyze and implement e-procurement, customer relationship management, e-marketing, and supply chain management strategies to optimize business processes and improve efficiency.

CO3: Design and implement secure e-business systems, utilizing digital signatures, secure protocols, digital payment systems, and web services to ensure reliable and trustworthy transactions.

CO4: Leverage sensors, IoT, business analytics, and big data to drive decision-making, optimize supply chain traceability, and enhance e-business capacity planning and recommender systems.

CO5: Develop and apply advanced e-business strategies, including collaborative filtering, dynamic pricing, and online auction mechanisms to drive business growth and competitiveness.

3. COURSE SYLLABUS

UNIT – I:

Introduction to E-Business: Introduction, Types of e-business transactions, Business Models on the web, Innovative E-Business models for Bricks and mortar firms, Inter and Intra Organizational Business Process, Information system foundations, Types of business information system, Decision support for the management, Enterprise Resource planning, Connecting with Stakeholders.

UNIT-2:

E-Procurement: E-procurement -Reengineering the traditional procurement process, E-procurement -New paradigms in the procurement process, E-procurement procurement Implementation issues and risks, Customer relationship management, E-Marketing, Supply Chain Management I -The Information flow, Supply Chain Management II –integration, Supply Chain Management III – interoperability, Supply Chain Management IV -logistics and distribution, Supply Chain Management V -E-Commerce supply chain, Components of E-Business Infrastructure, Internet and the Web, Networking resources, Hardware and software resources, Data resources.

UNIT-3:

Security categories, Security terminologies, Digital signature, Protocols for security: TLS, Impact of security protocol on server performance, Digital Payment systems, Interoperability of information system, Electronic data interchange (EDI), Fundamentals of web services, Fundamentals of cloud based systems, Automatic data capture using RFID, Automatic data capture using RFID and its applications, GPS and GIS in supply chain.

UNIT -4:

Sensors and IOT: Traceability Across the supply chain , Business Analytics and Big data, Decision support Concepts, Understanding the web log, Using the Web log: Web usage mining, User behavior modeling from web log, E-Business Capacity Planning, Introduction to Recommender System, Content Based Recommender System.

UNIT-5:

Collaborative Filtering Based Recommender System, Association and Demographics Based Recommended System, Dynamic Pricing, Introduction to Auction, Economic Considerations in Auction, Winner Determination Problem, Online auction issues.

4. BOOKS AND REFERENCES

1. Management Information Systems: Managing the Digital Firm, Laudon and Laudon, Pearson
2. Scaling for E-Business, Menasce & Almeida, PHI
3. eBusiness & eCommerce – Managing the Digital Value Chain, Meier & Stormer, Springer
4. eBook is available in springerlink.com
5. Some reference books, Internet Resources, and Research Papers

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30090 - PRODUCT AND BRAND MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

Course Description:

This course provides a comprehensive overview of product and brand management, focusing on product concepts, innovation, and design thinking for new product development. It explores key elements of brand management, such as brand equity, lifecycle, and architecture, while integrating ethics and spirituality into product and brand strategy. The course prepares students to manage and develop products and brands effectively in a competitive market.

Course Outcomes (COs)

After the completion of the course, the student will be able to:

CO1. Understand product concepts, classifications, characteristics, and product planning for category analysis.
CO2. Apply insight, innovation, and design thinking to new product development.
CO3. Recognize the essentials of brand management, including brand equity, value, and loyalty.
CO4. Analyze brand life cycles and organizational designs for effective brand architecture.
CO5. Measure brand equity and integrate ethics into product and brand management.

Course Syllabus

Unit-I

Introduction to Product Management: Product concepts, Product Classification, Product Line and Product mix, Product Characteristics. Product Planning and Product category analysis.

Unit-II

Insight, Innovation and design Thinking, New product Development.

Unit-III

Brand and Brand Management: Essentials of a good Brand Name, Types of Brands and Brand Equity and Value chain Brand Valuation and Brand Loyalty

Unit-IV

Brand Life cycles and Organizational Designs and Brand Architecture

Unit-V

Brand Equity Measurement, Ethics and Spirituality for Product and Brand Management

REFERENCES

1. Donald, R.L., & Russell S.W. (2002). *Product Management* (3rd Ed.). Tata McGraw Hill
2. Keller, K.L., & Swaminathan, V. (2019). *Strategic Brand Management: Building, Measuring and Managing Brand Equity* (5th Ed.). Prentice Hall
3. Trott, P. (2008). *Innovation Management and New Product Development* (4th Ed.). Prentice Hall
4. Kapferer, J. (2012). *The New Strategic Brand Management: Advanced Insights and Strategic Thinking* (5th Ed.). Kogan Page
5. Reis, A., & Trout, J. (2001). *Positioning: The Battle for Your Mind*. McGraw Hill Education

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

COURSESTRUCTURE

A30091 – MANAGEMENT INFORMATION SYSTEM

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	0	42	0	0	3	40	60	100

1. Course Description

1. The objective of this course focuses on the design, implementation and management of information systems in organizations.

2. It integrates technology, people, and processes to provide effective solutions for business operations and decision-making.

3. The course provides a deep understanding of how information systems support organizational functions, improve business processes, and drive strategic initiatives.

Course Outcomes (COs)

After the completion of the course, the student will be able to:

- Understand the Fundamentals of Management Information Systems
- Understand the Foundations of Business Intelligence (BI)
- Understand IT Strategy and its Role in Business Success
- Technologies are shaping modern IT infrastructures and driving innovation
- Understand and Apply Knowledge Management Principles

2. Course Syllabus

UNIT I

Introduction to Management Information systems: Types of MIS, Capabilities, Complements, CCR Framework; Role of manager with respect to IT in an organization, Database management systems, Data Warehousing

UNIT II

Foundations of business intelligence, Data and Text Mining, Strategic Enterprise Systems - ERP, SCM, CRM, SRM, Operational Support Systems - Manufacturing Systems, Sales and Marketing Systems, HRIS, Finance and Accounting Systems

UNIT III

IT Strategy and Balanced Scorecard – IT strategies, IT- business alignment, balanced scorecard, cloud and vendor strategies, Mobile and E-commerce – B2C, B2B and e-procurement, C2C and mobile commerce

UNIT IV

Emerging Technologies – Cloud computing, Big Data Technologies, Internet of Things, Bring Your Own Device (BYoD,) Virtual Reality, Augmented Reality, Block chain, Artificial Inelligence.

UNIT V

Knowledge Management – Decision Support Systems, Expert Systems, Learning Management Systems, Executive Information Systems, Social , ethical and security Issues in Management information system

Books and references

1. Kenneth C. Laudon & Jane P. Laudon. “Management Information Systems”. Pearson Publishing.
2. Reading material from Harvard Business School Repository

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

COURSESTRUCTURE

A30093 – Human Factors Engineering

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

The objective of this course is to Human Factors and Ergonomics (HFE) is central to supporting the design, evaluation, operation and maintenance of human-centric systems in a variety of disciplines ranging from and not limited to design, engineering and management.

Course Outcomes (COs)

After the completion of the course, the student will be able to:

- Understanding human factors:
- Learning how to design systems to avoid injuries
- Learning how to apply human factors engineering concepts to evaluate existing system
- Learning about the role of automation in modern system

2. Course Syllabus

UNIT I

Introduction to Human Factors and Ergonomics, Ergonomics, Anthropometry, Workstation Design, Anthropometry in Workstation Design, Physiology, Workload, and Physical Work Capacity.

UNIT II

Design of Manual Material Handling Tasks, Ergonomic Design of Computer Workstations, Industrial Application: Work Posture for Tasks, Hand Tool Design.

UNIT III

Measurement and Evaluation of Physical Environment: Visual Environment, Measurement and Evaluation of Physical Environment: Thermal Environment and Vibratory Environment.

UNIT IV

Measurement and Evaluation of Physical Environment: Auditory Environment, Ergonomic Design, Manufacturing and Assembly, Ergonomic Design for Manufacturing and Assembly.

UNIT V

Human Factors Principles, Design of Shift Work, Human Factors Principles and Design of Shift Work, Ergonomic Performance of Work systems.

Books and references

1. Sanders, M. S. and McCormick, E. J., Human Factors in Engineering and Design, McGraw-Hill, Sixth Edition
2. Bridger, R. S., Introduction to Ergonomics, Taylor and Francis Group, Third Edition
3. Halander M, A Guide to Human factors and Ergonomics, Taylor and Francis Group, Second Edition