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 Gapyear 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

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.

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.

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 1hour 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.

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 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 each for 10 Marks.
Note: The answers for Part A and Part B shall be written in two separate answer books.

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 evaluatedas above for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

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.

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 marksfor 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 thesyllabus.

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

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 inany 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.

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

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 itis 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.

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.

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 Very good, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets Unsatisfactory grade, he/she has to repeat the above activity in the subsequent years along with the next year students.

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 faculties. 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.**

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 faculties. 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.

There shall be five skill-oriented courses offered during III semester to VII semester. Out of the fives kill 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

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.

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.

A student shall be promoted from III year to IV year only if he/she fulfils the academic requirementsof 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 asper 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 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.

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.

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 i^{th} subject and GP_i is the grade point scored by the student in the i^{th} 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 j^{th} 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 behavior 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).

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PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE AND ENGINEERING

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			-

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PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE AND ENGINEERING

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	SC	0	0	3	1.5	40	60	100
	TOTAL		13	00	13	19.5	240	560	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
A30010	Mathematics-II	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
A30203	Basic Electrical and Electronics Engineering	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
A30204	Basic Electrical and Electronics Engineering Lab	ES	0	0	3	1.5	40	60	100
A30032	Universal Human Values	MC	2	0	0	0	100*	-	100*
	TOTAL		15	00	13	19.5	240	560	800

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

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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
A30506	Object Oriented Programming through Java	PC	3	0	0	3	40	60	100
A30507	Database Management Systems	PC	3	0	0	3	40	60	100
A30016	Discrete Mathematics	BS	3	0	0	3	40	60	100
A30421	Digital electronics	ES	3	0	0	3	40	60	100
A30508	Object Oriented programming through Java Laboratory	PC	0	0	3	1.5	40	60	100
A30509	Database Management Systems Laboratory	PC	0	0	3	1.5	40	60	100
A30422	Digital Electronic Laboratory	ES	0	0	3	1.5	40	60	100
A30510	Android Application Development	SC	1	0	2	2	40	60	100
A30031	Environmental Science	MC	2	0	0	0	100*	0	100 *
TOTAL			18	0	11	21.5	360	540	900

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
A30011	Probability & Statistics	BS	3	0	0	3	40	60	100
A30511	Web Technologies	PC	3	0	0	3	40	60	100
A30512	Design and Analysis of Algorithms	PC	3	0	0	3	40	60	100
A30513	Operating Systems	PC	3	0	0	3	40	60	100
A30514	Software Engineering	PC	3	0	0	3	40	60	100
A30515	Web Technology 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
A30517	Operating System Laboratory	PC	0	0	3	1.5	40	60	100
A30518	Web Designing	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

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V SEMESTER (IIIYEAR)									
Course Code	Title of the Course	Category	Periods Per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A33503	Computer Networks	PC	3	0	0	3	40	60	100
A30520	Mobile Application& Development	PC	3	0	0	3	40	60	100
A30521	Artificial Intelligence	PC	3	0	0	3	40	60	100
	Open Elective-I	OE	3	0	0	3	40	60	100
	Professional Elective-I	PE	3	0	0	3	40	60	100
A30522	Mobile Application& Development Laboratory	PC	0	0	3	1.5	40	60	100
A30523	Artificial Intelligence Laboratory	PC	0	0	3	1.5	40	60	100
A30524	R Programming	SC	1	0	2	2	40	60	100
A30034	Gender Sensitization	MC	2	0	0	0	100*	0	100*
A30532	Summer Internship 2 Months (Mandatory)		0	0	0	1.5	100	0	100
		TOTAL	18	0	8	21.5	420	480	900

VI SEMESTER (IIIYEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30526	Cloud Computing	PC	3	0	0	3	40	60	100
A30527	DevOps	PC	3	0	0	3	40	60	100
A30528	Machine Learning	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
A30529	Cloud Computing Laboratory	PC	0	0	3	1.5	40	60	100
A30530	DevOps Laboratory	PC	0	0	3	1.5	40	60	100
A30531	Machine Learning Laboratory	PC	0	0	3	1.5	40	60	100
A30016	Professional English and communication skills laboratory	SC	1	0	2	2	100	0	100
A30033	Indian Constitution and multiculturalism	MC	2	0	0	0	100*	0	100*
		TOTAL	18	0	11	21.5	340	560	900

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PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B.TECH - COMPUTER SCIENCE AND ENGINEERING

VII SEMESTER (IV YEAR)

Course Code	Title of the Course	Categoy	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	Professional Elective(PE-III)	PE	3	0	0	3	40	60	100
A30560	Information Security								
A30561	Linux Environment Systems								
A30562	Natural Language Processing								
A30563	Data visualization Techniques								
A30585	Reinforcement Learning								
A30586	AI: Search Methods for Problem Solving								
A33147	Responsible and Safe AI Systems								
	Professional Elective(PE-IV)	PE	3	0	0	3	40	**60**	100
A30564	Object Oriented Analysis Design								
A30565	Wireless Sensor Networks								
A30566	Parallel Algorithms								
A30567	Computer Graphics								
A30589	Social Network Analysis								
A33150	Ethical Hacking								
33148	Introduction to Industry 4.0 and Industrial Internet of Things								
	Professional Elective(PE-V)	PE	3	0	0	3	40	**60**	100
A30568	Block Chain Technology								
A30569	Software Defined Networks								
A30570	Deep Learning								
A30571	Distributed Computing								
A30591	Cyber Security and Privacy								
A30592	Computer Architecture								
A30593	Machine Learning and Deep Learning -Fundamentals and Applications								

	Open Elective Course(OE-III)	OE	3	0	0	3	40	60	100
	Open Elective Courses(OE-IV)	OE	3	0	0	3	40	60	100
A30022	*Professional Ethics	HS	3	0	0	3	40	60	100
A30535	Amazon Web Services	SC	1	0	2	2	40	60	100
	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**	**0**	**2**	**23**	**380**	**420**	**800**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									
Honors/Minor courses (The hours Distribution can be3-0-2or3-1-0 also)			4	0	0	4	40	60	100

There is a provision for the Universities /Institutions to implement AICTE mandatory science Elective in seventh semester for 3 credits.

course "Universal Human Values 2: Understanding Harmony" under Humanities and social

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**
A30537	**Project(Major Project)** Project work, seminar and internship in industry (Internship along with Project Work)	PW	0	0	0	12	60	140	200
Internship (6Months)									
		TOTAL	**0**	**0**	**0**	**12**	**60**	**140**	**200**

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PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE AND ENGINEERING

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	SC	0	0	3	1.5	40	60	100
	TOTAL		13	00	13	19.5	240	560	800

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

COURSE STRUCTURE

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:Triple Integrals 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)

COURSE STRUCTURE

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

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

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

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

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

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)

COURSE STRUCTURE

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 Namdev Kamthane, 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)

COURSE STRUCTURE

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

2.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)

COURSE STRUCTURE

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)

COURSE STRUCTURE

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	30	70	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.

2. Course Objectives:

A30006.1 Students will be exposed to a variety of self-instructional, learner friendly modes of language learning

A30006.2 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.

A30006.3 Students will learn better pronunciation through stress, intonation and rhythm

A30006.4 Students will be trained to use language effectively to face interviews, group discussions, Public speaking

A30006.5 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

3. 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

4. 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

5. 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)

COURSE STRUCTURE

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) DanielY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019.

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

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
A30010	Mathematics-II	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
A30203	Basic Electrical and Electronics Engineering	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
A30204	Basic Electrical and Electronics Engineering Lab	ES	0	0	3	1.5	40	60	100
A30032	Universal Human Values	MC	2	0	0	0	100*	-	100*
	TOTAL		15	00	13	19.5	240	560	800

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

COURSE STRUCTURE

A30010 – MATHEMATICS – II

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 offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Linear Differential Equations of Higher Order, Equations Reducible to Linear Differential Equations and Applications, Partial Differential Equations – First order, Multi variable Calculus (Vector differentiation & Integration). Mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Pre/co requisites

- Calculus
- Vectors

2. Course Outcomes (COs)

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

A30010.1	Apply the mathematical principles to solve second and higher order differential equations.
A30010.2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
A30010.3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
A30010.4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
A30010.5	Analyze the vector calculus involving divergence, curl and their properties along with vector identities.
A30010.6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

3. Course Syllabus

UNIT-I: Differential Equations of First and Higher Order

Formation of differential equations, solutions to First order differential equations(Exact &Reducible to Exact),Higher order linear differential equations , complete solution, operator D, Solution of homogeneous &Non-Homogeneous linear differential equations, method of variation of parameters.

UNIT-II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

UNIT-III: Partial Differential Equations – First order

Formation of PDE by the elimination of arbitrary constants and arbitrary functions. solutions of first order linear and non-linear Partial differential equations (f(p,q) = 0,f(z,p,q) = 0,f(x,p) = F(y,q) ,Z = px +qy+f(x,y) ,f(x,y,z,p,q) = 0(Charpit's method)). Solutions of homogeneous higher order linear partial differential equations with constant coefficients.

UNIT-IV: Vector differentiation

Scalar and vector point functions, vector differential operator(DEL) Gradient,Directional derivatives, normal to surface, Divergence, Solenoidal vector and Curl, Irrational vector, vector identities.

UNIT-V: Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).Problems related to Green's, Stokes, Divergence theorems.

4. Books and Materials

Textbooks:

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

References:

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)

COURSE STRUCTURE

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 equationand 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 O2 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 UniversityPress,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)

COURSE STRUCTURE

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.

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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)

COURSE STRUCTURE

A30203 – BASIC ELECTRICAL & ELECTRONICS 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 is the fundamental course for engineering students. This course is intended to enhance the technical skills in understanding of the operation and design of basic components like resistor, inductor and capacitor voltage and current sources and finally a complex DC circuits. It is also important to learn about basic principles of operations DC and AC electrical machines with their applications.

This course covers fundamental topics that are common to a wide variety of electronic engineering devices and systems. The topics include an introduction to semiconductor devices and their applications. The course creates the background in the physics of the compound semiconductor-based electronic devices and also prepares students to learn about oscillators and op-amps.

Course Pre/Co-requisites:

Nil

2. Course Outcomes (COs)

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

A30203.1 State the basic laws and usage of components in electric circuits.

A30203.2 Investigate DC and AC circuits using different methods and laws.

A30203.3 Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation.

A30203.4 Understand the theory, operation and applications of semiconductor devices.

A30203.5 Determine various parameters of rectifier circuits using with and without filters.

A30203.6 Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT, FET to meet the given specifications.

3. Course Syllabus

PART A : ELECTRICAL ENGINEERING

UNIT-I

INTRODUCTION TO DC & AC ELECTRICAL CIRCUITS: Basic Circuit Components, Ohm's Law, Kirchhoff's Laws, Types of Sources, Resistive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor.

Network Theorems: Thevenin's, Norton's, and Superposition Theorems for DC Excitations.

Two Port Networks: Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters.

UNIT-II

DC MACHINES:

D.C Generators: Constructional Details of DC Machines, Principle of Operation of DC Generators, E.M.F Equation in D.C Generator, Types of D.C Generators and O.C.C. of a D.C. Shunt Generator.

D.C Motors:Principle of Operation of DC Motors, Torque Equation, Speed Control of D.C. shunt motor (Armature voltage control and Field flux control). Losses and Efficiency Calculation in D.C Motor- Swinburne's Test.

UNIT-III

AC MACHINES:

1-phase Transformers: Principle of Operation, Constructional Details, E.M.F. equation, Losses and Efficiency, OC & SC Tests.

3-Phase Induction Motors: Principle of Operation, Slip, Torque (Simple Problems).

3-phase Alternators: Principle of Operation-Constructional Details-EMF Equation.

PART B: ELECTRONICS ENGINEERING

UNIT-I

INTRODUCTION TO SEMICONDUCTOR DEVICES:

Semiconductor Physics: Atomic structure, energy bands, types of semiconductors, drift and diffusion Currents.

Semiconductor Devices: The P-N junction diode- forward bias, reverse Bias, volt-ampere characteristics, applications of diode.Diode as a rectifier- half wave rectifier, full wave rectifier, bridge rectifier, use of filters in electronic circuits. Zenerdiode-VI characteristics.

UNIT-II

TRANSISTOR CHARACTERISTICS (BJT & FET):

Bipolar Junction Transistor (BJT): Types, operation of NPN and PNP transistors, configurations- CB, CE and CC configurations and their input and output characteristics.

Field Effect Transistor (FET): Junction Field Effect Transistor (JFET)-construction,operation, VI characteristics,comparison of BJT and FET. MOSFET-Enhancement and Depletion MOSFET.

UNIT-III

OSCILLATORS AND OP-AMPS:

Oscillators: Types, Barkhausencriteria, Hartley and Colitt's oscillators, RC phase shift oscillator.

Operational Amplifiers (Op-Amps): Symbol, characteristics of an ideal Op-Amp, basic forms of Op-Amps- inverting &non-inverting amplifiers, applications of Op-Amps.

4. Books and Materials

Text Book(s):

1. M.S.Sukhija, T.K.Nagsarkar,*Basic Electrical and Electronics Engineering*, Oxford University Press, 1st Edition, 2012.
2. S.K Bhattacharya,*Basic Electrical and Electronics Engineering*, Pearson Education, 2012.
3. J.B. Gupta, *Electronic Devices and Circuits*, 3rd Edition, S.K. Kataria& Sons, 2008.

Reference Book(s):

1. M.S.Naidu and S. Kamakshiah,*Basic Electrical and Engineering*, Tata McGraw Hill, 3rd Edition, 2009.
2. Hughes,*Electrical and Electronic Technology*,Pearson Education.
3. J. Millman, C. Halkias, *Electronic Devices and Circuits*, TMH, 4th edition, 2010.

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

COURSE STRUCTURE

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, wel din g, 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. **Fitting Trade–**Making of a L-fit from the given M.SFl at material piece.
2. **Fitting Trade–**Making of a Square joint from the given M.SFl at material piece.
3. **Carpentry Trade–**Making of across a pjoint as per specification.
4. **Carpentry Trade**-To make ad ovetail joint a perspecification.
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 one one-way switch
11. **House Wiring:** One bulb connected by two Two- way switches
12. **House Wiring:** Staircase wiring
13. **House Wiring:** Tube light wiring
15. **House Wiring:** Go-DownWiring

4. Laboratory Equipment/Software/Tools Required

1. Fitting bench wise
2. Hack saw frame
3. Carpentry bench wise
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)

COURSE STRUCTURE

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 these to 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)

COURSE STRUCTURE

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)

COURSE STRUCTURE

A30204 – BASIC ELECTRICAL AND ELECTRONICS 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

2. Course Description

Course Overview

This course is designed to provide students with fundamental concepts of Electrical Circuits and Electrical Machines for lab experience. Verification of Thevenin's, Norton's &Super Position theorems and open and short circuit parameters and also determinethe efficiency of DC & AC machines.

This course is designed to provide students with fundamental concepts of Electronic Devices for lab experience.Analysis of V-I characteristics of diodes, BJT and FET.Study of operation of rectifiers with & without filters.

Course Pre/Co-requisites:

Nil

3. Course Outcomes (COs)

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

A30204.1	Practically verify Super position,Thevenin's, Noton's theorems and Open and Short circuit parameters.
A30204.2	Predetermine the Efficiency of a given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator by using Swinburne's test.
A30204.3	Predetermine the Efficiency and Regulation at any given load and Power Factor of a transformer by using OC & SC tests.
A30204.4	Analyze the V-I characteristics of P -N Junction Diode and Zener Diode.
A30204.5	Analyze the input and output characteristics of BJT, Common Source Configuration Output and Transfer Characteristics of JFET.
A30204.6	Determine the ripple content present in half-wave and full-wave rectifiers using with and without filters.

4. Course Syllabus

PART – A

BASIC ELECTRICAL ENGINEERING LABORATORY

(Any Six Experiments)

1. Verification of Superposition Theorem.
2. Verification of Thevenin's and Norton's Theorem.
3. Determination of Open circuit and Short circuit parameters of two – port network.
4. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at any given load and Power Factor).
7. Open circuit characteristics of DC Shunt Generator and determination of critical field resistance and critical speed.

PART – B

BASIC ELECTRONICS LABORATORY

(Any Six Experiments)

1. P-N Junction Diode and Zener Diode Volt-Ampere Characteristics.
2. Half-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
3. Full-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
4. Bipolar Junction Transistor in CE Configuration-Input and Output Characteristics,
5. Junction field effect Transistor in Common Source Configuration- Output and Transfer Characteristics.
6. Frequency of Oscillation of Hartley and Colpitt's Oscillator.
7. Verification of Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR

4. Books and Materials

Text Book(s):

1. V. N. Mittle and ArvindMittle ,*Basic Electrical Engineering*,McGraw Hill (India) Pvt. Ltd., 2nd Edition, 2005.
2. T.K.Nagsarkar and M.S. Sukhija, *Basic Electrical Engineering*, OxfordUniversity Press, 2nd Edition, 2011.
3. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications, 9th Edition, 2006.

Reference Book(s):

1. M.S.Naidu and S. Kamakshiah,*Basic Electrical Engineering*, TataMcGraw Hill, 3rd Edition, 2009.
2. Hughes, *Electrical and Electronic Technology*,10th edition 2010,Pearson Education
3. J.B.Gupta, "Electronic Devices and Circuits", 3rd Edition, S.K.Kataria& Sons, 2008.

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

COURSE STRUCTURE

A30032-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	32	0	0	0	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:

A30032.1 Understand the significance of value inputs in a classroom and start applying them in their life and profession

A30032.2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

A30032.3 Understand the value of harmonious relationship based on trust and respect in their life and profession

A30032.4 Understand the role of a human being in ensuring harmony in society and nature.

A30032.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

A30032.6 Analyze the value of maintaining ethical values in critical situations

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Course Syllabus

UNIT – I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

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; correct appraisal 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 (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha*)- 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

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE AND ENGINEERING

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
A30506	Object Oriented Programming through Java	PC	3	0	0	3	40	60	100
A30507	Database Management Systems	PC	3	0	0	3	40	60	100
A30016	Discrete Mathematics	BS	3	0	0	3	40	60	100
A30421	Digital electronics	ES	3	0	0	3	40	60	100
A30508	Object Oriented programming through Java Laboratory	PC	0	0	3	1.5	40	60	100
A30509	Database Management Systems Laboratory	PC	0	0	3	1.5	40	60	100
A30422	Digital Electronic Laboratory	ES	0	0	3	1.5	40	60	100
A30510	Android Application Development	SC	1	0	2	2	40	60	100
A30031	Environmental Science	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
A30011	Probability & Statistics	BS	3	0	0	3	40	60	100
A30511	Web Technologies	PC	3	0	0	3	40	60	100
A30512	Design and Analysis of Algorithms	PC	3	0	0	3	40	60	100
A30513	Operating Systems	PC	3	0	0	3	40	60	100
A30514	Software Engineering	PC	3	0	0	3	40	60	100
A30515	Web Technology 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
A30517	Operating System Laboratory	PC	0	0	3	1.5	40	60	100
A30518	Web Designing	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

Course Code	SC	Course Title
A30513	Skill Oriented Course-I	Animation Design
		Android Application Development
		Sentiment Analysis
A30519	Skill Oriented Course -II	Web Designing
		Game Graphics programming
		Computer hardware and Trouble Shooting

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R20-COURSE STRUCTURE

III – SEMESTER

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
A30506	Object Oriented Programming through Java	PC	3	0	0	3	40	60	100
A30507	Database Management Systems	PC	3	0	0	3	40	60	100
A30016	Discrete Mathematics	BS	3	0	0	3	40	60	100
A30421	Digital electronics	ES	3	0	0	3	40	60	100
A30508	Object Oriented programming through Java Laboratory	PC	0	0	3	1.5	40	60	100
A30509	Database Management Systems Laboratory	PC	0	0	3	1.5	40	60	100
A30422	Digital Electronic Laboratory	ES	0	0	3	1.5	40	60	100
A30510	Android Application Development	SC	1	0	2	2	40	60	100
A30031	Environmental Science	MC	2	0	0	0	100*	0	100 *
TOTAL			18	0	11	21.5	360	540	900

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

A30506 –OBJECT ORIENTED PROGRAMMING THROUGH 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:

A30506.1	Apply object oriented concepts for solving general purpose problems A30506.2 Use inheritance, user defined packages and interfaces for code reusability
A30506.3	Apply exception handling and multithreading for robust and efficient application development
A30506.4	Implement collection frameworks to store and retrieve data efficiently
A30506.5	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

A30507– 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:

A30507.1	Apply suitable data model for given application
A30507.2	Construct optimized SQL queries to solve real time problems
A30507.3	Apply suitable normal form to eliminate data redundancy
A30507.4	Use suitable transaction model to avoid Deadlock
A30507.5	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

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

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, binary codes, 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 slave JK 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 Education International, 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

A30508 –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. A30506- Object Oriented Programming Using Java

2. Course Outcomes (COs)

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

A30508.1	Design solutions for the problems of general purpose applications using object oriented concepts.
A30508.2	Generate reusable codes using inheritance, user defined packages and interface
A30508.3	Write robust and efficient code using exception handling and multithreading concepts
A30508.4	Implement collection frameworks and file handling techniques to store and retrieve data
A30508.5	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. Using 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.

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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

A30507 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 Description

Course 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 Education International, 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

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30510– 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:

A30510.1 Understand the different types of mobile devices.

A30510.2 Learn how to apply Android Operating System on mobile.

A30510.3 They can understand the systems mobile application distribution.

A30510.4 Implementation of mobile design principles.

A30510.5 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 RETRIEVINGDATA:** 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.

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.

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R20-COURSE STRUCTURE

IV – SEMESTER

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
A30011	Probability & Statistics	BS	3	0	0	3	40	60	100
A30511	Web Technologies	PC	3	0	0	3	40	60	100
A30512	Design and Analysis of Algorithms	PC	3	0	0	3	40	60	100
A30513	Operating Systems	PC	3	0	0	3	40	60	100
A30514	Software Engineering	PC	3	0	0	3	40	60	100
A30515	Web Technology 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
A30517	Operating System Laboratory	PC	0	0	3	1.5	40	60	100
A30518	Web Designing	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

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:

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

COURSE STRUCTURE

A30511- 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 enrich their knowledge in web technologies by applying HTML, CSS concepts in developing the web pages. It highlights the importance of client and server side scripting languages like PHP and XML. It also focuses on the web services and their importance. The learners of this course can choose their career as web developer.

Course Pre/corequisites

A30506- Object Oriented programming through Java

2. Course Outcomes (COs)

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

A30511.1 Construct a basic website using HTML and Cascading Style Sheets.

A30511.2 Build dynamic web page using Java Script objects and event handling mechanisms.

A30511.3 Develop server side programs using Servlets and Java Server Page.

A30511.4 Construct web pages in PHP to represent data in XML format. A30511.5

Use AJAX and web services to develop interactive web applications

3. Course Syllabus

UNIT-I

Website Basics, Html 5, CSS 3, Web 2.0 9 Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image –HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images –Colors – Shadows – Text – Transformations – Transitions – Animations.

UNIT-II

Client Side Programming Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request –SQL.

UNIT-III

Server Side Programming Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example .

UNIT-IV

PHP and XML An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database.XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation.

UNIT-V

Introduction to Ajax and Web Services: AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

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.
2. A.A. Puntambekar, *Internet Programming,* Technical publications, 2nd Edition, 2019

Reference Book(s)

1. Chris Bates, *Web Programming – Building Intranet Applications*, 3rd Edition, Wiley Publications, 2009.
2. Gopalan N.P. and Akilandeswari J., —*Web Technology*‖, Prentice Hall of India, 2011.

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

A30513– 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:

A30513.1	Apply the basic principles of Operating Systems in system programming A30513.2 Apply the process synchronization concepts in multiprogramming environment
A30513.3	Solve the memory management problems with paging and segmentation techniques
A30513.4	Design algorithmic strategies to handle deadlock problems
A30513.5	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

COURSE STRUCTURE

A30514 – 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:

A30514.1	Understand the various phases of software development life cycles and software Requirements.
A30514.2	Possess necessary skills to elicit the requirements of a software system and to create well written software documentation involving appropriate system models.
A30514.3	Design, implement and evaluate a computer based system, process, component or program to meet desired needs within realistic constraints specific to the field
A30514.4	Construct software projects by integrating components with appropriate user interface
A30514.5	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.

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COURSE STRUCTURE

A30515-WEB TECHNOLOGY 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 aim of this course is to have practical experience on web page designing using HTML/XML, style sheets and also exposed to creation of user interfaces using Java applets. This course also provides hands on practice of dynamic web pages using server side scripting language and the frameworks such as JSP Strut, spring, AJAX. The learners of this course can choose their career as web developer.

Course Pre/corequisites

A30509 -Web Technologies

2. Course Outcomes (COs)

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

A30515.1 Construct Web pages using HTML/XML and style sheets.

A30515.2 Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.

A30515.3 Develop dynamic web pages using server side scripting.

A30515.4 Use PHP programming to develop web applications.

A30515.5 Construct web applications using AJAX and web services.

3. Course Syllabus

List of Experiments:

1. Create a web page with the following using HTML
   a. To embed a map in a web page
   b. To fix the hot spots in that map
   c. Show all the related information when the hot spots are clicked.
2. Create a web page with the following.
   a. Cascading style sheets.
   b. Embedded style sheets.
   c. Inline style sheets. Use our college information for the web pages.
3. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
4. Write programs in Java using Servlets:
   a. To invoke servlets from HTML forms
   b. Session tracking using hidden form fields and Session tracking for a hit count
5. Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.

6. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
7. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document
8. Validate the form using PHP regular expression.
   PHP stores a form data into database.
9. Write a web service for finding what people think by asking 500 peoples opinion for any consumer product.

4. Laboratory Equipment/Software/Tools Required

Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server, WAMP/XAMPP

5. 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.
2. A.A. Puntambekar, *Internet Programming,* Technical publications, 2nd Edition, 2019

Reference Book(s)

1. Chris Bates, *Web Programming – Building Intranet Applications*, 3rd Edition, Wiley Publications, 2014.

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

A30517– 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

A30515: Operating Systems

2. Course Outcomes (COs)

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

A30517.1 Apply appropriate CPU scheduling algorithm for the given problem.

A30517.2 Perform resource management for optimal utility of CPU. A30517.3

Implement algorithms handling deadlock problems

A30517.4 Implement the concepts of secured file system for confidentiality and authentication. A30517.5

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.

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COURSE STRUCTURE

A30518– WEB DESIGNING

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 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.

Course Pre/corequisites

A30509 Web Technologies

2. Course Outcomes (COs)

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

A30518.1 Apply the principles of creating an effective web page. A30518.2

Apply the elements of design with regard to the web. A30518.3 Create the

language of the web: HTML and CSS.

A30518.4 Develop skills in analyzing the usability of a web site.

A30518.5 Understand how to plan and conduct user related to web usability.

3. Course Syllabus

1. **BASICS IN WEB DESIGN**: Brief History of Internet, What is World Wide Web, Why create aweb site and Standards, Public demand requirement.
2. **WEB DESIGN PRINCIPLES**: Basic principles involved in developing a web site, PlanningProcess, rules of web designing, Page design, Home Page Layout and Design Concept.
3. **INTRODUCTION TO HTML**: Introduction to HTML , HTML Documents, Basic structure of anHTML document , Creating an HTML document ,Mark up Tags and Heading-Paragraphs
4. **INTRODUCTION TO ELEMENTS OF HTML**: Working with Text, Working with Lists, Tables andFrames Working with Hyperlinks, Images and Multimedia, Forms and controls.
5. **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.Laboratory Equipment/Software/Tools Required

Dream Weaver, MySQL or Equivalent, Apache Server, WAMP/XAMPP

5. 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)

Chris Bates, *Web Programming – Building Intranet Applications*, 3rd Edition, WileyPublications, 2014.

COURSE STRUCTURE

V –SEMESTER

V SEMESTER (IIIYEAR)									
Course Code	Title of the Course	Category	Periods Per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A33503	Computer Networks	PC	3	0	0	3	40	60	100
A30520	Mobile Application& Development	PC	3	0	0	3	40	60	100
A30521	Artificial Intelligence	PC	3	0	0	3	40	60	100
	Open Elective-I	OE	3	0	0	3	40	60	100
	Professional Elective-I	PE	3	0	0	3	40	60	100
A30522	Mobile Application& Development Laboratory	PC	0	0	3	1.5	40	60	100
A30523	Artificial Intelligence Laboratory	PC	0	0	3	1.5	40	60	100
A30524	R Programming	SC	1	0	2	2	40	60	100
A30034	Gender Sensitization	MC	2	0	0	0	100*	0	100*
A30532	Summer Internship 2 Months (Mandatory)		0	0	0	1.5	100	0	100
	TOTAL		18	0	8	21.5	420	480	900

Mandatory Courses

Course Code	Title of the Course
A30031	Environmental Science
A30032	Human Values and Ethics
A30033	Indian Constitution and Multiculturalism
A30034	Gender Sensitization

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COURSE STRUCTURE

A33503– COMPUTER 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 is introduced as a professional core offering insight into important aspects of computer networks. It covers the functionality of each layer in computer networks, besides highlighting the flow of control and congestion control algorithms. This course helps the learner in selecting a domain path leading to cyber security specialization.

2. Course Outcomes (COs)

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

A33503.1	Apply the networking concepts in configuring the systems
A33503.2	Illustrates error handling mechanism in data link layer A33503.3
	Analyze the routing algorithms in finding the shortest path
A33503.4	Apply transport protocols in network communications
A33503.5	Implements domain name service and network security in the communication segment.

3. Course Syllabus

UNIT-I

Introduction: Network hardware, Network software, Reference models-OSI,TCP/IP, examples of networks-the internet, 4G mobile phone networks, RFID and sensor networks.

Physical Layer: Guided Transmission, Wireless Transmission, Public switched telephone networks Structure of the telephone system, FDM, TDM, Switching.

UNIT-II

Data Link Layer: Design issues, error detection and correction, elementary data link protocol, sliding window protocols. Medium access sub layer: the channel allocation problem, multiple access protocols, Ethernet, wireless LANS.

UNIT-III

Network Layer: Network layer design issues, routing algorithms-shortest path routing, flooding, hierarchical routing, broadcast, multicast, distance vector routing, link state routing.

Congestion Control: Congestion control algorithms, Quality of service, application requirements, Traffic Shaping, the network layer in the internet, IPV4 protocol, IP- addresses, Internet control protocols, IPV6.

UNIT-IV

Transport Layer: Transport services, elements of transport protocols and the internet transport Protocols TCP and UDP protocols.

UNIT-V

Domain Name System: The DNS name space, domain resource records, name servers, Network security: introduction to cryptography, DES—the Data Encryption Standard, RSA.

4. Books and Materials

Text Book(s)

1. Andrew S. Tanenbaum, David J, *Computer Networks*, Pearson Education /PHI, 5th edition 2016.

Reference Book(s)

1. BehrouzA.Forouzan,*DataCommunicationsandNetworking,*TMH,4thedition2017.
2. S.Keshav*, An Engineering Approach to Computer Networks,* Pearson Education, 2nd edition 2014.

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COURSE STRUCTURE

A30520 - MOBILE APPLICATION 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

This course provides fundamentals of smart phone programming and android software development construct and apply knowledge on how to develop User Interface for a mobile application Design, develop and substitute basic things on data persistence, content provider, messaging, and location based services for a mobile application.

2. Course Outcomes (COs)

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

A30520.1 Able to recognize the importance of knowledge on Android programming basics
A30520.2 Able to construct the various aspects of user interfaces.
A30520.3 Able to apply knowledge on displaying pictures, menus and data services.
A30520.4 Able to develop application on content provider and messaging services.
A30520.5 Able to substitute on the fundamentals of location based services, and creating your own services.

3. Course Syllabus

UNIT–I

Getting started with android programming: What is android, obtaining the required tools, Creating first android application, Using Android Studio for Android Development . Activities, fragments & Intents: Understanding activities, linking activities using intents, fragments, displaying notifications.

UNIT–II

Getting to know the android user interface: Understanding the components of a screen, adapting to display orientation, managing changes to screen orientation, utilizing the action bar, creating the user interface programmatically, listening for UI notifications.

Designing User Interface with Views: Using basic views, using picker views, using list views to display long lists

UNIT–III

Displaying pictures and Menus with Views : Using image views to display Pictures-Gallery and Image View views, using menus with views, analog and digital clock views, Data Persistence: Saving and loading user preferences, persisting data to files, creating and using databases.

UNIT–IV

Content Providers Sharing data in android, using a content provider, creating own content providers. Messaging: SMS messaging, sending E-mail.

UNIT–V

Location based services,Displaying maps, getting a location data, monitoring a location, building a location tracker. Developing android services: Creating your own services.

4. Books and Materials

Text Book(s):

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

References(s):

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012

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COURSE STRUCTURE

A30521 – 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

The aim of this course is to create computer programs that can solve problems and achieve goals like humans would. This course covers problem solving, logical reasoning, planning, knowledge representation and machine learning concepts. In this course, the students are acquainted with the fundamental knowledge for understanding AI and also the basics of designing intelligent agents that can solve general purpose problems. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

Course Pre/corequisites

A30011-Probability and Statistics
A30014-Formal Languages and Automata Theory

2. Course Outcomes (COs)

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

A30521.1 Understand the fundamental concepts of Artificial Intelligence.

A30521.2 Solve problems by applying a suitable search method.

A30521.3 Solve problems by applying the heuristic search method. A30521.4

Understand constraint satisfaction problems.

A30521.5 Understand the Knowledge Representation techniques.

3. Course Syllabus

UNIT-I

Introduction: What Is AI? Risk and benefits of AI, Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments and the Structure of Agents.

UNIT-II

Solving Problems by Searching: Problem-Solving Agents, Example Problems, Searching for Solutions. Uninformed Search Strategies: BFS, DFS, Depth –limited search, IDA, Bidirectional search.

UNIT-III

Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Memory-bounded heuristic search, learning to search better. Heuristic Functions.

UNIT-IV

Constraint satisfaction problem: Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Backtracking Search for CSPs, The Structure of Problems. **UNIT-V**

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Objects and Modal Logic, Reasoning Systems for Categories, Reasoning with Default Information.

4. Books and Materials

Text Book(s)

1. RussellStuart, and Peter Norvig. "Artificial intelligence: a modern approach." (2002).

Reference Book(s)

1. Artificial Intelligence, Ritch & Knight, TMH

2. Artificial Intelligence, Saroj Kaushik.

3. Introduction to Artificial Intelligence, Philip C Jackson

4. Artificial Intelligence: The Basics, Kevin Warwick

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COURSE STRUCTURE

A30522 - MOBILE APPLICATION DEVELOPMENT 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 Description

Course Overview

This Laboratory presents to learn how to develop Applications in android environment to develop user interface applications, data persistence, messaging and location based services.

Course Pre/corequisites:

A35015- Computer Network

2. Course Outcomes (COs)

Course outcomes

After successful completion of smart phone programming lab students will be:

A30522 .1 Able to acquire practical knowledge on Android programming.

A30522 .2 Able to understand the implementation aspects of user interfaces.

A30522 .3 Able to understand the implementation of image view and persistent data services.

A30522 .4 Able to acquire practical knowledge on messaging services.

A30522 .5 Able to understand the practical exposure on implementation of location based services.

3. Course Syllabus

The student is expected to be able to do the following problems, though not limited.

1. a) Create an Android application that shows Hello + name of the user and run it on anemulator.

b) Create an application that takes the name from a text box and shows hello Message alongwiththe name entered in text box, when the user clicks the OK button.

2. Create an application that has as button, when the user clicks the button it should display second activity which has edit text and an OK button. When user writes something on theedit text and clicks the OK button it should go back to first activity and display content of edit textin the form of toast.

3. Create a screen that has input boxes for User Name, Password, and Address, Gender (radiobuttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) anda submit button. On clicking the submit button, print all the data below the Submit Button.

Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.

4. Develop an application that shows names as a list and on selecting a name it should show thedetails of the candidate on the next screen with a “Back” button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.

5. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.

6. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.

7. a) Create an application to display images in gallery and Image Views.

b) Create an application to display analog and digital clock.

8. a) Create a user registration application that stores the user details in a database table.

b) Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.

9. a) Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.

b) Create an application that shows all contacts of the phone along with details like name, mobile number

etc.

10. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.
11. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.
12. Develop an application that shows the current location's latitude and longitude continuously as the device is moving (tracking).
13. Create an application that shows the current location on Google maps. 14.Create an application that illustrates sending E-mail.
15. Create an application that illustrates SMS messaging.

4. Laboratory Equipment/Software/Tools Required

1. Amazon Web Services(AWS)
2. Microsoft Azure
3. Google Cloud Platform

5. Books and Materials

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

COURSE STRUCTURE

A30523 – 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 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/corequisites

1. A30014- Formal Languages and Automata Theory
2. A35023 - Artificial Intelligence

2. Course Outcomes (COs)

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

A30523.1 Execute statistical problems to produce appropriate solutions

A30523.2 Categorize the problem for selection of an appropriate algorithm

A30523.3 Compare computational complexity of AI problems for better efficiency

A30523.4 Demonstrate various AI algorithms based on empirical and theoretical proofs for performance statistics

3. Course Syllabus

1. Write a Program to implement Breadth First Search
2. Write a Program to implement Depth First Search
3. Write a Program to implement A* search
4. Write a program to implement Crypt arithmetic using Constraint satisfaction problem
5. Write a program to implement Hill Climbing Search
6. Write a program to implement 8-Puzzle game
7. Write a program to implement N-Queens problem
8. Write a program to Blocks World
9. Write a program to implement Chatbot application
10. Write a program to implement water Jug Problem

4. Laboratory Equipment/Software/Tools Required

1. Open source scripting language- Python

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30524– R 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	0	40	60	100

1. Course Description

Course Overview

The aim of this course is to learn how to program in R and how to use R for effective data analysis. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code. Topics in statistical data analysis will provide working examples.

2.Course Outcomes (COs)

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

A30524.1 Understand and apply the basics in R programming in terms of constructs, control statements, string functions

A30524.2 Apply the functions on matrix rows and columns and list operators

A30524.3 Work on Data frames and tabular type of DATA

A30524.4 Understand and write reliable code using OOP concepts in R

A30524.5 Understand and apply R Interfaces for Other languages

3. Course Syllabus

UNIT I

Introduction: Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorised operations – NA and NULL values – Filtering – Vectorised if-then else.

UNIT II

Matrices, Arrays and Lists: Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction– Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists

UNIT III

Data Frames: Creating Data Frames – Matrix-like operations in frames – Merging Data Frames – Applying functions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Control statements – Arithmetic and Boolean operators and values - Returning Boolean values – functions are objects –Recursion.

UNIT IV

OOP: S3 Classes – S4 Classes – Managing your objects – Input/Output – accessing keyboard and monitor – reading and writing files – accessing the internet – String Manipulation - Use of String Utilities in the edtdbg Debugging Tool.

UNIT V

Graphics &Interfacing : Graphics – Creating Graphs – Customizing Graphs – Saving graphs to files – Creating three-dimensional plots - Interfacing R to other languages –Writing C/C++ Functions to Be Called from R - Using R from Python.

4. Books and Materials

Text Book(s)

1. Norman Matloff “The Art of R Programming: A Tour of Statistical Software Design”, No Starch Press, 2011

Reference Book(s)

1. Mark Gardener, “Beginning R – The Statistical Programming Language”, Wiley, 2013
2.Robert Knell, “Introductory R: A Beginner's Guide to Data Visualization, Statistical Analysis and Programming in R”, Amazon Digital South Asia Services Inc, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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	0	100

1. Course Description

Course Overview

The main objective of this course is to develop student's 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.

2. Course Outcomes (COs)

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

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 -I

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 -II**

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 -III

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 -IV

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- V**

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. Books and Materials

Text Book(s)

1. A. Suneeta, UmaBhrugubanda,Towards a world of equals: A Bilingual Textbook on gender

Reference Book(s)

1. Sen, Amartya. "More thanone Million Women are Missing." New York ReviewofBooks 37,20(20 DecembeR2090).

2. TripiLahiri, BytheNumbers: Where Indian Women Work, Women's StudiesJournal(14November2012)

COURSE STRUCTURE

VI –SEMESTER

VI SEMESTER (IIIYEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30526	Cloud Computing	PC	3	0	0	3	40	60	100
A30527	DevOps	PC	3	0	0	3	40	60	100
A30528	Machine Learning	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
A30529	Cloud Computing Laboratory	PC	0	0	3	1.5	40	60	100
A30530	DevOps Laboratory	PC	0	0	3	1.5	40	60	100
A30531	Machine Learning Laboratory	PC	0	0	3	1.5	40	60	100
A30016	Professional English and communication skills laboratory	SC	1	0	2	2	100	0	100
A30033	Indian Constitution and multiculturalism	MC	2	0	0	0	100*	0	100*
	TOTAL		18	0	11	21.5	340	560	900

Professional Electives

Professional Elective– 2	
Course Code	Title of the Course
A30555	Big Data technologies
A30556	Parallel algorithms
A30557	Adhoc and sensor Networks
A30558	Design Patterns

Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A30181	Basic Civil Engineering	3-0-0	3	CE
A30182	Building Planning and Construction	3-0-0	3	CE
A30183	Disaster Management	3-0-0	3	CE
A30184	Water Resources Conservation	3-0-0	3	CE
A30281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A30282	Renewable Energy Sources	3-0-0	3	EEE
A30283	Electrical Measuring Instruments	3-0-0	3	EEE
A30284	control Systems Engineering	3-0-0	3	EEE
A30381	Optimization Techniques	3-0-0	3	ME
A30382	Mechanical Technology	3-0-0	3	ME
A30383	Introduction to Automobile Systems	3-0-0	3	ME
A30481	Basic Electronics	3-0-0	3	ECE
A30482	Introduction to Communication Systems	3-0-0	3	ECE
A30483	Fundamentals of IoT	3-0-0	3	ECE
A30484	Introduction to Embedded systems	3-0-0	3	ECE
A30485	CISCO Networking	3-0-0	3	ECE
A30581	Basic Data Structures	3-0-0	3	CSE
A30582	Fundamentals of DBMS	3-0-0	3	CSE
A30583	Basics of Software Engineering	3-0-0	3	CSE
A30584	Python for Everyone	3-0-0	3	CSE
A30585	Computer Organization and Operating Systems	3-0-0	3	CSE
A30586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A30587	Fundamentals of Web Technologies	3-0-0	3	CSE
A30588	Introduction to Java Programming	3-0-0	3	CSE
A30081	Research Methodology	3-0-0	3	H&S
A30082	Intellectual Property Rights	3-0-0	3	H&S
A30083	National Service Scheme	3-0-0	3	H&S
A30084	Yoga	3-0-0	3	H&S
A30085	Design Thinking	3-0-0	3	H&S
A30086	Management science	3-0-0	3	H&S
A30087	Entrepreneurship Development	3-0-0	3	H&S

Mandatory Courses

Course Code	Title of the Course
A30031	Environmental Science
A30032	Human Values and Ethics
A30033	Indian Constitution and Multiculturalism
A30034	Gender Sensitization

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COURSE STRUCTURE

A30526- CLOUD COMPUTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	40	60	100

1. Course Description

Course Overview

The aim of the course is to provide insight of cloud computing architecture and its services. It includes various cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). This course helps the learner to best utilize the cloud services in their domain and helps in choosing cloud computing as their profession.

Course Pre/co requisites

A35014- Operating systems

A35015-Computer Networks

2. Course Outcomes (COs)

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

A30526.1 Analyze cloud delivery models for better architecture.

A30526.2 Implement infrastructure as a service model for industrial applications.

A30526.3 Organize the cloud platform model for optimization services.

A30526.4 Develop various application software with software as service.

A30526.5 Design cloud computing reference architecture for delivery models.

3. Course Syllabus

UNIT-I

Introduction Of Delivery Models In Cloud Computing: introduction to cloud delivery models, list various cloud delivery models, advantages of delivery models in cloud, trade-off in cost to install versus flexibility, cloud service model architecture.

UNIT-II

Infrastructure as a Service (IaaS): Introduction to Infrastructure as a Service delivery model, characteristics of IaaS, architecture, examples of IaaS, applicability of IaaS in the industry.

UNIT-III

Platform as a Service (PaaS): Introduction to Platform as a Service delivery model, characteristics of PaaS, patterns, architecture and examples of PaaS, applicability of PaaS in the industry.

UNIT-IV

Software as a Service (SaaS): Introduction to Software as a Service delivery model, characteristics of SaaS, architecture, examples of SaaS, applicability of SaaS in the industry.

UNIT-V

Cloud Computing Reference Architecture (CCRA): Introduction to cloud computing reference architecture (CCRA), benefits of CCRA, architecture overview, versions and application of CCRA for developing clouds.

4. Books and Materials

Text Book(s):

1. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, *Cloud Computing: Principles and Paradigms* by Wiley Press, New York, USA, 2017.

Reference Book(s):

1. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, *Cloud computing for Dummies* (November 2016).

2. Michael J. Kavis, *Architecting the Cloud: Design Decisions for Cloud Computing Service Models* by, Wiley Press, 2016.

3. Michael J. Kavis, Gautam Shroff, *Enterprise Cloud Computing Technology Architecture Applications*, Cambridge University Press, 2013.

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COURSE STRUCTURE
A30527- DevOps

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	30	70	100

1. Course Description

This course enlightens the agile relationship between development and IT operations and provides the knowledge about various DevOps tools. It focuses on professional principles that help business units Collaborate inside the enterprise and break down traditional silos. The learner can lead his/her professional career in service and commercial enterprises.

2. Course Pre/co requisites

A1510 Software Engineering

3. Course Outcomes (COs)

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

A30527.1 Analyze DevOps methodologies in collaboration with the Development and Operation s team

A30527.2 Apply configuration management strategies for better integrations and deployment

A30527.3 Make use of various DevOps tools to ease of collaboration and development

A30527.4 Determine the speed of productivity for in time delivery

A30527. 5 Application deployment and configuration for uninterrupted usage

4. Course Syllabus

UNIT - I

SDLC: Introduction to SDLC, agile model.

Introduction to Devops: Introduction, Devops features, work management, source code management, build automation, delivery automation, understanding code quality, automation of CI/CD.

UNIT - II

Source Code Management: What is version control and GIT, standard branching workflows, Branching Workflow, GitHub flow.

UNIT - III

Build Automation , CI: Build(CI) Orchestration using Jenkins automation server, build tools , Apache Maven, Gradle, Ant, NPM/Node.js, pipeline Basics, Jenkins master, node, agent, and execu tor, freestyle projects & pipelines.

UNIT - IV

Artifact Management: Nexus, JFrogArtifactory, JFrogArtifactory as Kubernetis registry, Helm chart for Microsoft azure pipeline.

Continuous Delivery: Software components can be released in short cycles, every change is automatically deployed to the Dev environment.

UNIT - V

Continuous Deployment: Extends continuous delivery, every change is automatically deployed to Production, CD Flow, containerization with Docker, Introduction to Docker, images & containers, Docker File, working with

containers and publish to Docker Hub, Configuration management Ansible, Introduction to Ansible, Ansible tasks, Roles, Jinja templates, vaults, deployments using Ansible.

4. Books and Materials

TextBook(s)

1. Gene Kim, Jez Humble, Patrick Debois, John Willis, *The DevOps Handbook: How to Create World,Class Agility, Reliability,* 2016.

Reference Book(s)

1. Michael Huttermann, *DevOps for Developers*, 2012.
2. Joakim Verona**,** *Practical DevOps,* packet open source publications*,* 2016.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30528–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

The goal of this course is to give foundation in machine learning and basic concepts used in the design of classification, prediction models. It includes different machine learning algorithms and methods. In addition, it helps to apply the appropriate machine learning technique for classification, pattern recognition and optimization and decision problems.

Course Pre/co requisites

A30011-Probability and Statistics

2. Course Outcomes (COs)

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

A30528.1 Distinguish between, supervised, unsupervised and semi-supervised learning

A30528.2 Apply the opt machine learning strategy for any given problem

A30528.3 Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem

A30528.4 Design a system that uses the appropriate graph models of machine learning

A30528.5 Modify existing machine learning algorithms to improve classification efficiency

3. Course Syllabus

UNIT-I

Introduction: Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminates – Perceptron – Linear Seperability – Linear Regression.

UNIT-II

LINEAR MODELS: Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT-III

TREE AND PROBABILISTIC MODELS: Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

UNIT-IV

DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS: Dimensionality Reduction – Linear Discriminate Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning –

Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

UNIT-V

GRAPHICAL MODELS: Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

4. Books and Materials

Text Book(s)

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning‖, First Edition, McGraw Hill Education, 2013

Reference Book(s)

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
3. EthemAlpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014

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COURSE STRUCTURE

A30529– CLOUD COMPUTING 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 the laboratory is to provide insight of cloud computing architecture and its services. Students gain hands-on practice on various cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) using Amazon Web Services (AWS), Microsoft azure and Google cloud platform. This course helps the learner to best utilize the cloud services in their domain and even helps in choosing cloud computing as their profession.

Course Pre/co requisites

A30014-Operating systems

A30015-Computer Networks

A35021-Cloud Computing

2. Course Outcomes (COs)

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

A30529.1 Develop and deploy applications for better cloud utility

A30529.2 Design web services for modern commercial applications

A30529.3 Analyze the performance, scalability, and availability of the underlying cloud technologies for business requirements

A30529.4 Implement software installation for utility of its applications

A30529.5 Compare various cloud computing platforms for better cloud services

3. Course Syllabus

List of cloud computing programs

1: Creating a Warehouse Application in SalesForce.com.

2: Creating an Application in SalesForce.com using Apex Programming Language. 3: Implementation of SOAP Web services in C#/JAVA Applications.

4: Para-Virtualization using VM Ware‘s Workstation/Oracle‘s Virtual Box and Guest O.S. 5: Installation and Configuration of Hadoop

6: Create an application (Ex: Word Count) using Hadoop Map/Reduce. 7: Case Study: PAAS (Facebook, Google App Engine).

8: Case Study: Amazon Web Services

4. Laboratory Equipment/Software/Tools Required

1. Amazon Web Services (AWS)
2. Microsoft Azure
3. Google Cloud Platform

5. Books and Materials

Text Book(s)

1. RajkumarBuyya, James Broberg, and Andrzej Goscinski, *Cloud Computing: Principles and Paradigms* by Wiley Press, New York, USA, 2017.

Reference Book(s)

1. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, *Cloud computing for Dummies* (November

2016).

2. Michael J. Kavis, *Architecting the Cloud: Design Decisions for Cloud Computing Service Models* by, Wiley Press, 2016.

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COURSE STRUCTURE

A30530 - DevOps 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 Description

Course Overview

DevOps is the combination of cultural philosophies, practices, and tools that increases an organization's ability to deliver applications and services at high velocity: evolving and improving products at a faster pace than organizations using traditional software development and infrastructure management processes. This speed enables organizations to better serve their customers and compete more effectively in the market Students are advised to thoroughly go through this manual rather than only topics mentioned in the syllabus as practical aspects are the key to understanding and conceptual visualization of theoretical aspects covered in the books.

2. Course Outcomes (COs)

A30530.1: Understand the background and driving forces for taking an Agile Approach to Software Development
A30530.2: Make use of different open source agile tools
A30530.3: Apply Design principle and Refactoring to achieve agility
A30530.4: Implement Test Driven Development using Xunit
A30530.5: Test web apps using selenium
A30530.6: Make use of configuration management tools for project

3. Lab Programs

1. Introduction to Linux Operating System(Pre-requisite)
2. Understand the background and driving forces for taking an Agile Approach to Software Development
3. Case study of project management using traditional software development model
4. Comparative study of open source agile tools
5. Installation and use of open source agile tools for software development
6. Project Planning and Tracking System using extreme programming(XP)
7. Implementation of SOLID principles using any programming language
8. Software testing using agile tools
9. Test Driven Development using XUnit.
10. Testing web apps using selenium
11. Study and use of Configuration Management tools
12. Study and use of DevOps Automation Tools

4. Books and Materials

TextBook(s)

2. Gene Kim, Jez Humble, Patrick Debois, John Willis, *The DevOps Handbook: How to Create World,Class Agility, Reliability,* 2016.

Reference Book(s)

3. Michael Huttermann, *DevOps for Developers*, 2012.

4. Joakim Verona**,** *Practical DevOps,* packet open source publications*,* 2016.

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COURSE STRUCTURE

A30531–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	3	40	60	100

1. Course Description

Course Overview

The goal of this course is to give foundation in machine learning and basic concepts used in the design of classification, prediction models. It includes different machine learning algorithms and methods. In addition, it helps to apply the appropriate machine learning technique for classification, pattern recognition and optimization and decision problems.

Course Pre/Co requisites

Algebra and Calculus

Probability and Statistics

2. Course Outcomes (COs)

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

A30531.1 Distinguish between, supervised, unsupervised and semi-supervised learning A30531.2

Apply the opt machine learning strategy for any given problem

A30531.3 Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem

A30531.4 Design a system that uses the appropriate graph models of machine learning A30531.5 Modify

existing machine learning algorithms to improve classification efficiency

3. Lab Programs

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. 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.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. 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.
6. 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.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
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 Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

4. Books and Materials

Text Book(s)

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning‖, First Edition, McGraw Hill Education, 2013

Reference Book(s)

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30033 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	0	100	0	100

1. Course Description

Course Overview

This course is designed in such a way that it gives an overview of Indian Constitution. This course provides the knowledge on importance of constitution, structure of executive, legislature and judiciary, central and state relation financial and administration.

Course Pre/co requisites

There are no prerequisites and co requisites for this course.

2. Course Outcomes (COs)

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

A30033.1 Understand historical background of the constitution making and its importance for building a democratic India.

A30033.2 Explain the role of President and Prime Minister.

A30033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

A30033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India

A30033.5 Analyze the decentralization of power between central, state and local self-government. A30033.6

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: Indian Constitution - Sources 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, Centre- State relationship, President: Role, power and position, Prime Minister and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions.

UNIT - III

State Government and its Administration: Governor - Role and Position – Chief Minister 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 Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zilla Panchayat, Elected officials and their roles, CEO ZilaPanchayat: 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. Books and Materials

Text Book(s)

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.

Reference Book(s)

1. A. Siwach, *Dynamics of Indian Government & Politics*.
2. D.C. Gupta, *Indian Government and Politics*.
3. H.M.Sreevai, *Constitutional Law of India*, 4thedition in 3 volumes (Universal Law Publication)

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B.TECH - COMPUTER SCIENCE AND ENGINEERING

VII SEMESTER (IV YEAR)

Course Code	Title of the Course	Categoy	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	Professional Elective(PE-III)	PE	3	0	0	3	40	60	100
A30560	Information Security								
A30561	Linux Environment Systems								
A30562	Natural Language Processing								
A30563	Data visualization Techniques								
A30585	Reinforcement Learning								
A30586	AI: Search Methods for Problem Solving								
A33147	Responsible and Safe AI Systems								
	Professional Elective(PE-IV)	PE	3	0	0	3	40	**60**	100
A30564	Object Oriented Analysis Design								
A30565	Wireless Sensor Networks								
A30566	Parallel Algorithms								
A30567	Computer Graphics								
A30589	Social Network Analysis								
A33150	Ethical Hacking								
33148	Introduction to Industry 4.0 and Industrial Internet of Things								
	Professional Elective(PE-V)	PE	3	0	0	3	40	**60**	100
A30568	Block Chain Technology								
A30569	Software Defined Networks								
A30570	Deep Learning								
A30571	Distributed Computing								
A30591	Cyber Security and Privacy								
A30592	Computer Architecture								
A30593	Machine Learning and Deep Learning -Fundamentals and Applications								

	Open Elective Course(OE-III)	OE	3	0	0	3	40	60	100
	Open Elective Courses(OE-IV)	OE	3	0	0	3	40	60	100
A30022	*Professional Ethics	HS	3	0	0	3	40	60	100
A30535	Amazon Web Services	SC	1	0	2	2	40	60	100
	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**	**0**	**2**	**23**	**380**	**420**	**800**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									
Honors/Minor courses (The hours **Distribution can be3-0-2or3-1-0 also)**		4	0	0	4	40	60	100	

***There is a provision for the Universities /Institutions to implement AICTE mandatory science Elective in seventh semester for 3 credits.**

course "Universal Human Values 2: Understanding Harmony" under Humanities and social

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
A30537	**Project(Major Project)** Project work, seminar and internship in industry (Internship along with Project Work)	PW	0	0	0	12	60	140	200
Internship (6Months)									
	TOTAL		**0**	**0**	**0**	**12**	**60**	**140**	**200**

COURSE STRUCTURE
A30022-PROFESSIONALETHICS

HoursPerWeek			HoursPerSemester			Credits	AssessmentMarks		
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 forstudentsandhelpguidetheirprofessionalbehaviors.Thiscoursebroadensethicalandprofessionalvalueswhichunderpinprofessionalskillsandbehaviors.Thestudentsworkefficiently by prioritizing, organizing and managing their time effectively. They make the best useof 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 inprofession. 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 leaders which 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–UniversalHumanValues-understandingharmony

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

UNITI: ETHICS AND PROFESSIONALISM

Introduction, perspectives of Ethics ,branches of Ethics, just icevscare,Ethics and morality, Ethics and religion, Ethics and maturity, Ethics and the professions, Rules vs principles, Ethical dilemma.

UNIT II: PERSONAL EFFECTIVENESS

Prioritizing, organizing and managing time effectively, Using technology effectively-Using email effectively How to manage email, Maintaining professional competence and life long learning-Continuing professional development, 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: COMMUNICATIONANDINTERPERSONALSKILLS

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 MATERIAL

1.TEXT BOOKS:

1. Rizvi,M.Ashraf,*EffectiveTechnicalCommunication,*Noida,McGraw-HillEducation.2009.
2. Engineering Ethics(Includes Human Values)"by Govindarajan M

2.REFERENCE BOOKS:

1. Professional Ethics in Engineering" by IADhotre VS Bagad
2. ProfessionalEthicsInEngineering"byDrVJayakumarandLakshmiPublications
3. Engineering Ethics: Challenges and Opportunities" by W Richard Bowen

Professional Electives

Professional Electives

Professional Elective– 1	
Course Code	**Title of the Course**
A30551	Data mining
A30552	Image processing
A30553	Software Testing
A33150	Ethical Hacking
A30579	The Joy of Computing using Python
A30591	Cyber Security and Privacy
Professional Elective– 2	
Course Code	**Title of the Course**
A30555	Big Data technologies
A30556	Parallel algorithms
A30557	Adhoc and sensor Networks
A30558	Design Patterns
Professional Elective– 3	
Course Code	**Title of the Course**
A30560	Information Security
A30561	Linux Environment Systems
A30562	Natural Language Processing
A30563	Data visualization Techniques
A30585	Reinforcement Learning
A30586	AI: Search Methods for Problem Solving
A33147	Responsible and Safe AI Systems
Professional Elective– 4	
Course Code	**Title of the Course**
A30564	Object Oriented Analysis Design
A30565	Wireless Sensor Networks
A30566	Parallel Algorithms
A30567	Computer Graphics
A30589	Social Network Analysis
A33150	Ethical Hacking
A33148	Introduction to Industry 4.0 and Industrial Internet of Things
Professional Elective– 5	
Course Code	**Title of the Course**
A30568	Block Chain Technology
A30569	Software Defined Networks
A30570	Deep Learning
A30571	Distributed Computing
A30591	Cyber Security and Privacy
A30592	Computer Architecture
A30593	Machine Learning and Deep Learning -Fundamentals and Applications

Professional Elective-I

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COURSE STRUCTURE

A30551 – DATA MINING

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 introduced to drive the students to reach the depth of data science with warehousing and mining concepts. It covers data pre-processing, mining frequent patterns, associations and correlations, classification and prediction, and cluster analysis**.** In addition to this it paves way for machine learning algorithms. This helps the student to choose the career path in data science and architect the data for better decision making.

Course Pre/corequisites

A35006-Database Management Systems

2. Course Outcomes (COs)

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

A30551.1 Apply the principles of business intelligence in the commercial segment A30552.2

Make use of pre-processing techniques for data organization

A30553.3 Implement association, clustering and rule based mining for Market based analysis A30554.4

Analyze the data mining classification technique for data differentiation

A30555.5 Design the unsupervised clustering algorithms for data analysis

3. Course Syllabus

UNIT-I

Data Mining: Fundamentals of data mining, data mining functionalities, classification of data mining systems, data mining task primitives.

UNIT-II

Data Pre Processing: Descriptive data summarization, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation.

UNIT-III

Mining Frequent Patterns, Associations and Correlations: Efficient and scalable frequent item set mining methods, association rules, and correlation analysis

UNIT-IV

Classification and Prediction: Decision tree induction, various classification methods, accuracy and error measures, ensemble methods.

UNIT-V

Cluster Analysis: Types of data in cluster analysis, categorization and partitioning, hierarchical, density- based, grid-based, model-based clustering methods, outlier analysis.

4. Books and Materials

Text Book(s)

1. Jiawei Han, Michel Kamber, *Data Mining Concepts and Techniques*, 3/e, Elsevier, 2019.

Reference Book(s)

1. Alex Berson, Stephen Smith, *Data Warehousing Data Mining & OLAP*, TMH.

2. K.P.Soman, S.Diwakar, V.Ajay, *Insight into Data Mining*, PHI, 2008.

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COURSE STRUCTURE

A30552 - IMAGE 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 Description

Course Overview

In this course students will learn digital image processing techniques including representation, sampling and quantization, image acquisition, imaging geometry, image transforms, image enhancement, image smoothing and sharpening, and image restoration.

2. Course Outcomes (COs)

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

A30552.1 Interpret fundamental concepts of digital and colour image processing.

A30552.2 Exemplify image enhancement.

A30552.3 Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.

A30552.4 Summarize segmentation techniques for digital images.

UNIT-I:

INTRODUCTION TO DIGITAL IMAGE PROCESSING

Introduction: Digital image representation, Fundamental steps in image processing, Elements ofdigital image processing, Elements of visual perception, Simple image model, Sampling andQuantization, Basic relationships between pixels, Image transformations.

Applications: Medical imaging, Robot vision, Character recognition, Remote sensing.

UNIT–II:

IMAGE ENHANCEMENT

Need for image enhancement, Point processing, Histogram processing, Spatial filtering-Smoothing and Sharpening.

UNIT-III:

COLOR IMAGE PROCESSING

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

UNIT–IV:

IMAGE COMPRESSION

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffmancoding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG CompressionStandard.

UNIT–V:

IMAGE SEGMENTATION

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary.

Detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented

segmentation: Region growing, Region splitting and merging.

4.Books and Materials

Text Book(s)

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, 3rd Edition, Pearson Education, 2011.

Reference Book(s)

1. S Jayaraman, S Esakkirajan and T Veerakumar, “Digital Image Processing”, TMH, 2011.
2. S. Sridhar, “Digital Image Processing”, 2nd Edition, Oxford Publishers, 2016.

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COURSE STRUCTURE

A30553 - SOFTWARE TESTING

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	30	70	100

1. Course Description

Course Overview

This course presents a comprehensive study of software testing and quality control concepts. It covers the testing principles, methodologies, management strategies and techniques. In addition, it emphasizes on understanding the software testing process. This course is helpful in producing quality software and enables the student to choose the career path as software testing engineer.

Course Pre/co requisites

1. A2510- Software Engineering

2. Course Outcomes (COs)

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

A30553.1 List a range of different software testing techniques and strategies and be able to apply specific (automated) unit testing method to the projects.

A30553.2 Distinguish characteristics of structural testing methods.

A30553.3 Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible.

A30553.4 Discuss about the functional and system testing methods A30553.5

Demonstrate various issues for object oriented testing.

3. Course Syllabus

Unit-I

A Mathematical Context: A Perspective on Testing, Examples

Functional Testing: Boundary Value Testing, Equivalence Class Testing, Decision Table Based Testing, Retrospective on Functional Testing .

Unit-II

Structural Testing:

Path Testing- DD-Paths, Test Coverage Metrics, Basis Path Testing

Dataflow Testing- Define/Use Testing, Slice-Based Testing

Retrospective on Structural Testing- Gaps and Redundancies, Metrics for Method Evaluation.

UNIT - III

Integration Testing: Levels of Testing, Integration Testing- A Closer Look at the SATM System, Decomposition-Based Integration, Call Graph-Based Integration, Path-Based Integration

Unit – IV

System Testing - Threads, Basic Concepts for Requirements Specification, Finding Threads, Structural Strategies for Thread Testing, Functional Strategies for Thread Testing SATM Test Threads, System Testing Guidelines

Unit-V Object-Oriented Testing: Issues in Object-Oriented Testing, Class Testing, Object-Oriented Integration Testing, GUI Testing, Object-Oriented System Testing.

4. Books and Materials

Text Book(s)

1. Paul C. Jorgensen, Software Testing: A Craftsman‟s Approach, 3rd Edition, CRC Press, 2007.

Reference Book(s)

1. Boris Beizer, Software Testing Techniques, Dreamtech, 2009

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	30	70	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.

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	30	70	100

1. COURSE OBJECTIVES:

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.

2. COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

1. Describe the fundamental topics of hacking and network connectivity.
2. Implement the tools and techniques of Ethical hacking.
3. Learn the privacy, design and secure operations using cryptographic algorithms.
4. Apply the security and integrity tools in the cryptography system
5. Improving the secure and network systems.

3. COURSE 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, hardwaretrojans.

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.

4. Books and Materials

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

COURSE STRUCTURE

A30591 – Cyber Security and Privacy

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	30	70	100

1. COURSE OBJECTIVES:

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.

2. COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

A33150.1 Describe the fundamental topics of hacking and network connectivity.

A33150.2 Implement the tools and techniques of Ethical hacking.

A33150.3 Learn the privacy, design and secure operations using cryptographic algorithms.

A33150.4 Apply the security and integrity tools in the cryptography system

A33150.5 Improving the secure and network systems.

3. COURSE SYLLABUS

UNIT I

Introduction to cyber security: Confidentiality, Integrity and Availability. Foundations, Fundamental concepts, CIA, CIA triangle, data breach at target, Security management.

UNIT II

Governance, risk, compliance: (GRC)- GRC framework, security, Contingency planning, Incidence response, Disaster Recovery, BCP, Cyber security policy, ESSP, Risk Management.

UNIT III

Cyber Risk Identification: Assessment and Control, Cyber security in Industry perspective, defence Technologies Attack, Exploits, Information privacy, Theories.

UNIT IV

Cyber security technologies: Access control, Encryption, Standards. Foundations of privacy, Measurement, Privacy regulation-privacy, Anonymity, Regulation.

UNIT V

Data Breach: Privacy regulation in Europe,Privacy, The Indian Way - Data Protection, GDPR, DPDP, Aadhar, Economics and strategy, Economic value of privacy, privacy valuation, WTA and WTC, Business strategy and privacy,Espionage, Privacy vs safety.

4. Books and Materials

Text Book:

Michael E. Whitman, Herbert J. Mattord, (2018). Principles of Information Security, 6th edition, Cenage Learning, N. Delhi.

References:

1.Darktrace, “Technology” https://www.darktrace.com/en/technology/#machine-learning, accessed

November 2018.
2.Van Kessel, P. Is cyber security about more than protection? EY Global Information Security Survey 2018-2019.
3.Johnston, A.C. and Warkentin, M. Fear appeals and information security behaviors: An empirical study. MIS Quarterly, 2010.
4.Arce I. et al. Avoiding the top 10 software security design flaws. IEEE Computer Society Center for Secure Design (CSD), 2014.

Professional Elective-II

COURSE STRUCTURE

A30555 – BIG DATA

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 core concepts of big data, its applications and systems. It covers distributed programming, distributed file systems leading to Hadoop file systems and map-reduce programming concepts**.** In addition, it provides an introduction to Hadoop-Map reduce frameworks. The learners of this course can choose their domain in Data Engineering and can opt their career in Data Science and intern to increase the potential for data utility to transform the world.

Course Pre/corequisites

A1519- Data Mining

2. Course Outcomes (COs)

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

A35055.1 Analyze distributed programs for formation of large scale clusters

A35055.2 Apply enabling techniques of Hadoop and Map Reduce for distributed processing

A35055.3 Assemble the components of Hadoop and its Eco-System for efficient data storage and processing

A35055.4 Develop Map-Reduce programs in Java for performing large scale data analysis

A35055.5 Apply K-means clustering and Mahout Techniques for efficient data analysis

3. Course Syllabus

UNIT-I

Distributed Programming Using Java: Quick recap and advanced java programming generics, threads, sockets, simple client server programming using JAVA, difficulties in developing distributed programs for large scale clusters and introduction to cloud computing.

UNIT-II

Distributed File Systems leading to Hadoop File System: Introduction, using HDFS, Hadoop architecture, internals of Hadoop file systems.

UNIT-III

Map-reduce Programming: Developing distributed programs and issues, why Map- reduce and conceptual understanding of Map-reduce programming, developing Map-reduce programs in java, setting up the cluster with HDFS and understanding how Map- reduce works on HDFS, Running simple word count Map-reduce program on the cluster, additional examples of M-R programming.

UNIT-IV

Anatomy of Map-reduce Jobs: Understanding how Map- Reduce program works, tuning Map-Reduce jobs, understanding different logs produced by Map-Reduce jobs and debugging the Map- Reduce jobs.

UNIT-V

Case studies of Big Data analytics: Case studies of Big Data analytics using Map-Reduce programming, K- Means clustering, using Big Data analytics libraries using Mahout.

4. Books and Materials

Text Book(s)

1. Tom White, *Hadoop: The Definitive Guide*, 4th edition, O'reilly, 2015.

Reference Book(s)

1. Chuck Lam, *Hadoop in Action*, 2nd edition, Manning Publications, 2014.

2. David Flanagan, *Java in a Nutshell*, 6th edition, O'Reilly & Associates, 2014

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COURSE STRUCTURE

A30556 – PARALLEL 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

The aim of this course is to enrich the concepts on design, analysis and implementation of sequential as well as parallel algorithms. In particular, it focuses on pram algorithms, SIMD algorithms being supported by MIMD algorithms. The hardware industry requires students with the knowledge to develop algorithms with micro instructions while designing multiprocessors and controllers.

Course Pre/co requisites

A1512- Design and Analysis of Algorithms

2. Course Outcomes (COs)

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

A30556.1 Design parallel random access machines algorithms for standard problems and applications

A30556.2 Analyze efficiency of different parallel algorithms

A30556.3 Choose the mapping on multi computers for efficient data processing. (Assess multiprocessors and multicomputer for efficient data processing).

A30556.4 Design the matrix algorithms to reduce complexity.

A30556.5 Apply the graph algorithms to solve complex numeric problems

3. Course Syllabus

UNIT-I

Introduction: Parallel processing terminology, the sieve of Eratosthenes, PRAM algorithms - PRAM model of parallel computation, PRAM algorithms, reducing the number of processors.

Processor arrays, multiprocessors, and multicomputer: processor organizations, processor arrays, multiprocessor, Flynn's taxonomy.

UNIT-II

Mapping and Scheduling: Mapping data to processors on processor and multi computers, dynamic load balancing on multi computers, static scheduling on UMA (Uniform Memory Access) multi computers, deadlock.

UNIT-III

Elementary Parallel Algorithms: Classifying MIMD algorithms, reduction, prefix sums.

UNIT-IV

Matrix Multiplication: Sequential matrix multiplication, algorithms for processor arrays, algorithms for multiprocessor, algorithms for multi computers.

UNIT-V

Graph Algorithms: Searching a graph, connected components, all-pairs shortest path, single source shortest path, minimum-cost spanning tree.

4. Books and Materials

Text Book(s)

1. Michael J. Quinn, *Parallel Computing: Theory & Practice*, Tata McGraw Hill Edition, 2nd edition, 2017.

Reference Book(s)

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms*, University press, Second edition, 2011.

2. V Rajaraman, C Siva Ram Murthy, *Parallel computers- Architecture and Programming*, PHI learning, 2016.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30557 – ADHOC AND 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 is designed to:

- Introduce the concepts of Adhoc and Sensor Networks.
- Explain Routing algorithms suitable for Adhoc Networks.
- Understand the transport protocols for Adhoc networks
- Familiarize with the security issues of adhoc and sensor networks

Course Pre/co requisites

A1510- Computer Networks

A1511- Computer Networks Laboratory

2. Course Outcomes (COs)

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

A30557.1 Apply computer design and instruction set principles as per system requirements A30557.2 Analyze system requirements to remove redundancy

A30557.3 Propose sub-netting and routing strategies in addressing architectural issues A30557.4 Apply network management mechanisms for data security and privacy A30557.5 Develop hybrid mechanisms for effective interconnection

3. Course Syllabus

UNIT-I

IEEE 802 Networking Standard ,Fundamentals of WLANs, IEEE 802.11 standard. What is Wireless Internet?, Mobile IP, Cellular and Adhoc Wireless Networks, Applications of Adhoc Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.

UNIT-II

Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, ContentionBased Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that used Directional Antennas, Other MAC Protocols.

UNIT-III

Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table-Driven Routing Protocols, On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols, Power-Aware Routing Protocols.

UNIT-IV

Multicast Routing in Ad hoc Wireless Networks- Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An architecture reference model for multicast routing protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh- Based Multicast Routing Protocols, Summary of Tree and Mesh-Based Protocols. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions. TCP over Ad Hoc Wireless

Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.

UNIT-V

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks. Wireless Sensor Networks- Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other issues.

4. Books and Materials

Text Book(s)

1. James D. McCabe, *Network Analysis, Architecture and Design*, 3rd edition, Elsevier, 2014.

Reference Book(s)

1. Andrew S. Tanenbaum, *Computer Networks*, Fifth Edition, Prentice Hall, Upper Saddle River, New Jersey, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30558 - DESIGN PATTERNS

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 extends object-oriented programming by incorporating design patterns to create interactive applications. It includes patterns like creational, structural and behavioral. In addition it helps to recognize a design and enables to minimize the amount of refactoring by using primitive techniques such as objects, inheritance, and polymorphism. The learners will have a foundation to build more complex software applications.

Course Pre/co requisites

A1505- Object-oriented programming through JAVA

2. Course Outcomes (COs)

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

A30558.1 Apply the model-view-controller architecture for a given application

A30558.2 Propose the most suitable design pattern to solve a design problem

A30558.3 Inspect existing code to perform software refactoring

A30558.4 Apply the basic design principles for quality software

3.Course Syllabus

UNIT-I

Introduction to Design Patterns: Design pattern definition, design patterns in SmallTalk MVC, describing design patterns, catalog of design patterns, organizing the catalog, solving of design problems using design patterns, selection of a design pattern, use of design patterns.

UNIT-II

Creational Patterns: Abstract factory, builder, factory method, prototype, singleton, discussion of creational patterns.

UNIT-III

Structural Patterns: Adapter, bridge, composite**. Structural Patterns-2**: Decorator, façade, flyweight, proxy, discuss of structural patterns.

UNIT-IV

Behavioral Patterns Part-1: Chain of responsibility, command, interpreter, iterator, mediator, memento, observer.

UNIT-V

Behavioral Patterns Part -2: State, strategy, template method, visitor, and discussion of behavioral patterns. What to expect from design patterns, a brief history, the pattern community aninvitation, a parting thought.

3. Books and Materials

Text Book(s):

1. Erich Gamma, Rechard helm, Ralpjohnson, John vlissides, *Design PatternsElements of reusable object-oriented software*, Pearson Education, 2015.

Reference Book(s):

1. Mark Grand, *Patterns in JAVA* Vol-I, II & III, Wiley DreamTech, 2016.

Professional Elective-III

COURSE STRUCTURE

A30560-INFORMATION SECURITY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
4	0	0	42	0	0	3	40	60	100

Course Description

Course Overview:

This course focuses on the fundamentals of information security. Explain the importance of cryptographic algorithms, authentication and digital signatures. Basic categories of threats to computers and networks.

1. Course Outcomes(COs)

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

A30560. 1. Introduction to Information Security, Conventional Cryptographic Techniques.

A30560.2. Understand basic cryptographic algorithms**,**

A30560.3. Understand Authentication techniques and Digital Signatures.

A30560.4. Demonstrate how to secure a Program

A30560.5. Understand the network Security Issues.

2. CourseSyllabus

Unit 1 :

Introduction to Information Security : Attacks, Vulnerability, Security Goals , SecurityServices and mechanisms

Conventional Cryptographic Techniques : Conventional substitution and transposition ciphers, One-time Pad, Block, cipher and Stream Cipher, Steganography

Unit 2 :

Symmetric and Asymmetric Cryptographic Techniques : DES, AES, RSAalgorithms

Unit3:

Authentication and Digital Signatures : Use of Cryptography for authentication,Secure Hash function, Key management – Kerberos

Unit 4:

Program Security : Nonmalicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man- in-the- middle attacks, Covert channels

Unit 5:

Security in Networks : Threats in networks, Network SecurityControls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honey pots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal

Firewalls, IDS, Email Security – PGP,S/MIME

3. Books and Materials

1. Cryptography and Network Security : William Stallings, Pearson Education,411iEdition

2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2" Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, lst Edition.

2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2"d Edition

3. Information Security, Principles and Practice: Mark Stamp, Wiley India.

4. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH

5. Introduction to Network Security: Neal Krawetz, CENGAGELearning 6. Network Security and Cryptography: Bernard Menezes, CENGAGELearning

COURSE STRUCTURE

A30561-LINUX ENVIRONMENT SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
4	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course explains the fundamental ideas behind the open source operating system approach to programming. Knowledge of Linux helps to understand OS level programming. Like the successful computer languages that came before, Linux is the blend of the best elements of its rich heritage combined with the innovative concepts required by its unique environment. This course involves kernel concepts, basics commands, shell scripting, file processing ,Socket programming ,Processes, Inter process communication. This course is presented to students by power point projections, course handouts, lecture notes, assignments, objective and subjective tests

2. Course Outcomes (COs)

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

A30561.1 To teach principles of operating system including File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking Commands, Basic Linux commands, Scripts and filters.

A30561.2 To familiarize fundamentals of the Bourne again shell (bash), shell programming, pipes, input and output redirection Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts

A30561.3 To impart fundamentals of file concepts kernel support for file, File structure related systemcalls(file API's).

A30561.4 To facilitate students in understanding Inter process communication

A30561.5 To facilitate students in understanding semaphore and shared memory

3. Course Syllabus

UNIT 1:

INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX, features of LINUX, introduction to vi editor. Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , sort, nl, uniq, grep, egrep, fgrep,

cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio

UNIT 2:

Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

UNIT 3:

Grep: Operation, grep Family, Searching for File Content. Sed :Scripts, Operation, Addresses, commands, Applications, grep and sed. UNIX FILE STRUCTURE: Introduction to UNIX file system, inode (Index Node), file descriptors, system calls and device drivers. File Management :File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

UNIT 4:

PROCESS AND SIGNALS: Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lockcommands, deadlocks.

UNIT 5:

INTER PROCESS COMMUNICATION: Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget, msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands. INTRODUCTION TO SOCKETS: Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.

4. Books and Materials

W. Richard. Stevens (2005), Advanced Programming in the UNIX Environment, 3rd edition, PearsonEducation, New Delhi, India.

Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson

REFERENCES:

1. Linux System Programming, Robert Love, O'Reilly, SPD.

Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.

2.UNIX Network Programming, W.R. Stevens, PHI. UNIX for Programmers and Users, 3rd Edition,Graham Glass, King Ables, Pearson Education

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30563 - DATA VISUALIZATION 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 Over view

This course teaches how to design a data presentation that really makes an impact beyond spread-sheets and tables. In addition, this course provides the knowledge of Tableau's fundamental concepts and features: how to connect to data sources and present data using easy-to-understand visualizations. In this course, students are acquainted with principles of communicating data and in-depth tour of common visualization methods.

Course Pre/corequisites

Familiarity with data types, spread sheets and statistics is necessary.

1. Course Outcomes(COs)

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

A30563.1 Make use of Tableau for effective communication of data.

A30563.2 Creae advanced visualizations, formatting and calculations using Tableau

A30563.3 Analyze changes in data visualization over time.

A30563.4 Create different types of dashboards.

A30563.5 Analyze and recommend effective business decisions/solutions using a systematic, evaluative, andinformation-based approach.

2. Course Syllabus

UNIT-I

Communicating Data : A Step in the Process, A Model of Communication, Three Types of Communication Problems, Six Principles of Communicating Data.

UNIT-II

Introduction to Tableau : Using Tableau, Tableau Story, Tableau Products, Connecting to Data,The Tableau User Interface.

UNIT-III

Multiple Quantities: Scatter plots, Who Is Who?, Making it Exploratory, Adding Background Images,Stacked Bars, Regression and Trend Lines, The Quadrant Chart.

UNIT-IV

Changes in data visualization Over Time : The Origin of Time Charts, The Line Chart, The Dual-Axis Line Chart, The Connected Scatter plot, The Date Field Type and Seasonality, The Timeline, The Slope graph.

UNIT-V

Dashboards: Dashboards in Tableau, Types of Dashboards, Context Is King, Building Dashboards: Building an Exploratory Dashboard.

Books and Materials

TextBook(s):

1. BenJones, *Communicating Data withTableau:Designing,Developing,andDeliveringDataVis-ualizations*, O'ReillyMedia,2014.

ReferenceBook(s)

1. JoshuaN.Milligan,*LearningTableau2019-ThirdEdition*,PacktPublishing,2019.
2. AlexanderLoth,*VisualAnalyticswithTableau*,JohnWiley& Sons,2019.
3. JenniferJaneStirrup,*TableauDashboardCookbook*,PacktPubishing,2016

COURSE STRUCTURE

A30585–Reinforcement Learning

HoursPerWeek			HoursPerSemester			Credits	AssessmentMarks		
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 machine learning and deep learning, focusing on both theoretical foundations and practical implementations. Reinforcement learning is a paradigm that aims to model the trial-and-error learning process that is needed in many problem situations where explicit instructive signals are not available. It has roots in operations research, behavioral psychology and AI. The goal of the course is to introduce the basic mathematical foundations of reinforcement learning, as well as highlight some of the recent directions of research.

2. Course Outcomes (COs)

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

A30585.1	Understand the Fundamental Concepts of Reinforcement Learning
A30585.2	Full Analyze and Implement Dynamic Programming and Monte Carlo Methods
A30585.3	Apply Temporal Difference (TD) Learning and Q-Learning Algorithms
A30585.4	Design and Evaluate Function Approximation Techniques
A30585.5	Implement Advanced Reinforcement Learning Algorithms and Applications.

3. Course Syllabus

Unit -1

Introduction of Reinforcement Learning (RL): Basics of RL, key concepts like rewards, actions, states, and policies. **Bandit Problems**: Basic concepts and applications.**Bandit Algorithms – UCB, PAC, Bandit Algorithms – Median Elimination, Policy Gradient**

Unit 2:

Full RL & MDPsMarkov Decision Processes (MDPs): Foundations of MDPs and their role in RL,Full RL Framework: Integrating various RL components,Bellman Optimality: Bellman Equation:Bellman Optimality Equation for value functions and policies ,Dynamic Programming & TD Methods

UNIT-3:

Eligibility Traces Concept of Eligibility Traces: Understanding how they combine ideas from Monte Carlo and TD methods.**Types of Eligibility Traces**: Implementing methods like SARSA(λ) and Q(λ), **Function Approximation.**

UNIT-4:

Least Squares MethodsLeast Squares Temporal Difference (LSTD): Techniques for approximating value

functions,**Applications**: How LSTD methods are applied in RL.**Fitted Q, DQN & Policy Gradient for Full RLFitted Q Iteration**: A method for function approximation in Q-learning.**Deep Q-Networks (DQN)**: Introduction and workings of DQN in RL.**Policy Gradient Methods**: Advanced policy gradient techniques for full RL scenarios.

UNIT-5: Hierarchical RLHierarchical RL Concepts:

Understanding options, hierarchy, and temporal abstraction, **Applications and Methods**: Exploring methods like the Hierarchical Temporal Memory (HTM), **POMDPsPartially Observable Markov Decision Processes (POMDPs)**: Understanding the challenges and solutions in POMDPs.

4. Books and Materials TextBook(s):

1. E. Alpaydin, Introduction to Machine Learning, 3rd Edition, Prentice Hall (India) 2015.
2. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification, 2nd Edn., Wiley India, 2007.
3. C. M. Bishop, Pattern Recognition and Machine Learning (Information Science and Statistics),Springer, 2006.
4. M.K. Bhuyan, Computer Vision and Image Processing: Fundamentals and Applications, published by CRC press, USA, 2019.
5. S. O. Haykin, Neural Networks and Learning Machines, 3rd Edition, Pearson Education (India), 2016.
6. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016
7. Michael A. Nielsen, Neural Networks and Deep Learning , Determination Press, 2015
8. Yoshua Bengio, Learning Deep Architectures for AI, now Publishers Inc., 2009

A30586– Artificial Intelligence: Search Methods For Problem solving

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	42	0	0	2	30	70	100

1. Course Description

This course explores foundational search techniques used in artificial intelligence for problem-solving. It covers uninformed methods like breadth-first and depth-first search, as well as informed approaches such as A* and greedy search. Students will learn how to model problems as search spaces and apply these algorithms to find optimal solutions.

2. Course Outcomes (COs)

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

A30586.1 Model complex problems as search spaces and apply appropriate search techniques.

A30586.2 Design and evaluate heuristic functions to optimize search performance.

A30586.3 Implement uninformed and informed search algorithms, such as BFS, DFS, A*, and greedy search.

A30586.4 Analyze the efficiency, completeness, and optimality of different search strategies.

3. Course Syllabus

UNIT I

Introduction: Philosophy, Mind, Reasoning, Computation, Dartmouth Conference, The Chess Saga, Epiphenomena, State Space Search: Depth First Search, Breadth First Search, Depth First Iterative Deepening.

UNIT II

Heuristic Search: Best First Search, Hill Climbing, Solution Space, TSP, Escaping Local Optima, Stochastic Local Search, Population Based Methods: Genetic Algorithms, SAT, TSP, emergent Systems, Ant Colony Optimization, Finding Optimal Paths: Branch & Bound, A*, Admissibility of A*, Informed Heuristic Functions.

UNIT III

Space Saving Versions of A*: Weighted A*, IDA*, RBFS, Monotone Condition, Sequence Alignment, DCFS, SMGS, Beam Stack Search, Game Playing: Game Theory, Board Games and Game Trees, Algorithm Minimax,AlphaBeta and SSS*.

UNIT IV

Automated Planning: Domain Independent Planning, Blocks World, Forward &Backward Search, Goal StackPlanning, Plan Space Planning, Problem Decomposition: Means Ends Analysis, Algorithm Graphplan, Algorithm AO*,Rule Based Expert Systems: Production Systems, Inference Engine, Match-Resolve-Execute,Rete Net.

UNIT V

Deduction as Search: Logic, Soundness, Completeness, First Order Logic, Forward Chaining, BackwardChaining, Constraint Processing: CSPs, Consistency Based Diagnosis, Algorithm Backtracking, Arc Consistency, Algorithm Forward Checking.

4. Books and references

1. Deepak Khemani. A First Course in Artificial Intelligence, McGraw Hill Education (India), 2013.
2. Stefan Edelkamp and Stefan Schroedl. Heuristic Search: Theory and Applications, MorganKaufmann, 2011
3. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History and Prospects ofArtificial Intelligence, A K Peters/CRC Press; 2 edition, 2004.

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	42	0	0	2	30	70	100

1.COURSE OBJECTIVES:

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:
A33147.1 Develop an appreciation for what is involved in Learning models from data

A33147.2 Understand a wide variety of learning algorithms

A33147.3 Understand how to evaluate models generated from data

A33147.4 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. COURSE 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.

4. Text Books and Materials:

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

Professional Elective-IV

COURSESTRUCTURE

A30564 - OBJECT ORIENTED ANALYSIS AND 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.COURSE DESCRIPTION

Introduction to modeling and overview of UML.Designing Class & Object diagrams with the help of advanced structural modeling. Create use-case & interaction diagrams to model behavior of a Software system. Designing and implementing state machines using advanced behavioral modeling. Modeling subsystems using component and deployment diagrams.

CoursePre/corequisites

Familiarity with data types, spread sheets and statistics is necessary.

1. Course Outcomes(COs)

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

A30564.1. Learn the fundamental principles of object oriented modeling
A30564.2. Understand class and object diagrams for software systems
A30564.3. Identify the system behavior using use case and interaction diagrams
A30564.4. Modeling states and state graphs using advanced behavioral model
A30564.5. Analyzing and implementing system architecture by using architectural concepts

3. Course Syllabus

UNIT 1

Importance of modeling: object-oriented modeling, Software Development Life Cycle. Classes, Relationships, Common Mechanisms and diagrams.

UNIT 2

Advanced Structural Modeling, Class & Object Diagrams: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Terms, concepts, modeling technique for Class & Object Diagrams. Design class diagram for Library information system and ATM system.

UNIT 3

Basic Behavioral Modeling-I & II:

Interactions, Interaction diagrams. Use cases, Use case Diagrams, Activity Diagrams. Design Use cases, Use case diagrams, Interaction diagram and Activity diagram for library system andATM system.

UNIT 4

Advanced Behavioral Modeling:

Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Design s machine for different objects in the library Management system and ATM system.

UNIT 5:

Architectural Modeling:

Component, Deployment, Component diagrams and Deployment diagrams. Design &document of the system and ATM system.

4. Prescribed Textbooks:

Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling LanguageUser Guide, Pearson Education.

Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

Reference Books:

1. Meilir Page-Jones: Fundamentals of Object-Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech IndiaPvt. Ltd.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSETRUCTURE

A30565 - WIRELESS SENSOR NETWORKS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
4	0	0	42	0	0	3	40	60	100

1. Course Description

The main objective of this course is to understand the Basics of Wireless Sensor Networks , analysis of the architecture of WSN . It also provides the concept of Networking and Networkingin WSN

Pre-Requites

Basic knowledge of Data Communication Networks

2. Course Outcomes (COs)

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

A30565.1. Understand the Concepts of Wireless Sensor Networks

A30565.2. Apply knowledge of Architecture to Wireless Sensor Networks

A30565.3. Understand the Knowledge of Sensor Devices.

A30565.4. Examine the applications of Wireless Sensor Networks

A30565.5. Establishing infrastructure and simulations

3. Course Syllabus

UNIT 1:

INTRODUCTION TO WIRELESS SENSOR NETWORKS

Single-Node Architecture - Hardware Components- Network Characteristics- unique constraintsand challenges, Enabling Technologies for Wireless Sensor Networks- Types of wireless sensornetworks.

UNIT 2:

ARCHITECTURES

Network Architecture- Sensor Networks-Scenarios- Design Principle, Physical Layer and Transceiver Design Considerations, Optimization Goals and Figures of Merit, Gateway Concepts, Operating Systems and Execution Environments- Introduction to Tiny OS andnesC Internet to WSN Communication

UNIT 3:

NETWORKING SENSORS

MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - SMAC, - B-MAC Protocol, IEEE 802.15.4 standard and ZigBee, the Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management,Assignment of MAC Addresses, Routing Protocols Energy-Efficient Routing, Geographic Routing.

UNIT 4:

INFRASTRUCTURE ESTABLISHMENT

Topology Control, Clustering, Time Synchronization, Localization and Positioning, SensorTasking and Control.

UNIT 5:

SENSOR NETWORK PLATFORMS

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level softwareplatforms, Node level Simulators, State-centric programming.

4. Books and Materials

TEXT BOOKS:

Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless SensorNetworks", John Wiley, 2005.
Feng Zhao & Leonidas J.Guibas, "Wireless Sensor Networks-An Information ProcessingApproach", Elsevier, 2007
Waltenegus Dargie , Christian Poellabauer, "Fundamentals Of Wireless Sensor Networks
- Theory And Practice", By John Wiley & Sons Publications, 2011

REFERENCES:

KazemSohraby, Daniel Minoli, & TaiebZnati, "Wireless Sensor Networks-Technology,Protocols, and Applications", John Wiley, 2007.
Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30566 - PARALLEL 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	30	70	100

1. Course Description

The aim of this course is to enrich the concepts on design, analysis and implementation of sequential as well as parallel algorithms. In particular, it focuses on pram algorithms, SIMD algorithms being supported by MIMD algorithms. The hardware industry requires students with the knowledge to develop algorithms with micro instructions while designing multiprocessors and controllers.

Course Pre/corequisites

A30566- Design and Analysis of Algorithms

2. Course Outcomes (COs)

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

A30566.1 Design parallel random access machines algorithms for standard problems and applications

A30566.2 Analyze efficiency of different parallel algorithms

A30566.3 Choose the mapping on multi computers for efficient data processing. (Assess multiprocessors and multicomputer for efficient data processing).

A30566.4 Design the matrix algorithms to reduce complexity.

A30566.5 Apply the graph algorithms to solve complex numeric problems

3. Course Syllabus:

UNIT-I

Introduction: Parallel processing terminology, the sieve of Eratosthenes. PRAM algorithms - PRAM model of parallelcomputation, PRAM algorithms, reducing the number of processors.
Processor arrays, multiprocessors, and multicomputer: processor organizations, processor arrays, multiprocessor,Flynn's taxonomy.

UNIT-II

Mapping and Scheduling: Mapping data to processors on processor and multi computers, dynamic load balancing onmulti computers, static scheduling on UMA (Uniform Memory Access) multi computers, deadlock.

UNIT-III

Elementary Parallel Algorithms: Classifying MIMD algorithms, reduction, prefix sums.

UNIT-IV

Matrix Multiplication: Sequential matrix multiplication, algorithms for processor arrays, algorithms for multiprocessor,algorithms for multi computers.

UNIT-V

Graph Algorithms: Searching a graph, connected components, all-pairs shortest path, single source shortest path,minimum-cost spanning tree.

4. Books and Materials

Text Book(s)

1. Michael J. Quinn, *Parallel Computing: Theory & Practice*, Tata McGraw Hill Edition, 2nd edition, 2017.

Reference Book(s)

1. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, *Fundamentals of Computer Algorithms*, University press, Second edition, 2011.

2. V Rajaraman, C Siva Ram Murthy, *Parallel computers- Architecture and Programming*, PHI learning, 2016.

COURSE STRUCTURE
A30567 - COMPUTER GRAPHICS

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	30	70	100

1.Course Description

The goal of Computer graphics deals with generating images and art with the aid of computers. Today, computer graphics is a core technology in digital photography, film, video games, digital art, cell phone and computer displays, and many specialized applications. A great deal of specialized hardware and software has been developed, with the displays of most devices being driven by computer graphics hardware.

2.Course Pre/corequisites

Computer Networks

2.Course Outcomes (COs)

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

A30566.1 **Implement** the core concepts of computer graphics, including viewing, rojection, perspective,modeling and transformation in two and three dimensions.

A30566.2 **Apply** the concepts of colour models, lighting and shading models, textures, ray tracing, hidden surface elimination, anti-aliasing, and rendering.

A30566.3 **Interpret** the mathematical foundation of the concepts of computer graphics.

A30566.4 **Describe** the fundamentals of animation, parametric curves and surfaces, and spotlighting.

A30566.5 I**dentify** a typical graphics pipeline and apply graphics programming techniques to design and create computer graphics

3.Course Syllabus

UNIT-I

Introduction Computer Graphics and Primitive Algorithms: Introduction to Image and Objects, Image Representation, Basic Graphics Pipeline, Bitmap and Vector-Based Graphics, Applications of Computer Graphics, Display Devices, Cathode Ray Tubes, Raster-Scan Display, Random-Scan Display, Flat Panel Display, Input Technology, Coordinate System Overview.**Simple Line Drawing Methods**: Point Plotting Techniques, Qualities of good line drawing algorithms,The Digital Differential Analyzer (DDA), Bresenham's Algorithm, Generation of Circles

UNIT-II

TWO DIMENSIONAL TRANSFORMATIONS and CLIPPING AND WINDOWING: What is transformation?, Matrix representation of points, Basic transformation, Need for Clipping and Windowing, Line Clipping Algorithms, The midpoint subdivision Method, Other Clipping Methods, Sutherland - Hodgeman Algorithm, Viewing Transformations. GRAPHICAL INPUT TECHNIQUES Graphical Input Techniques, Positioning Techniques, Positional Constraints, Rubber band Techniques.

UNIT-III

3D Graphics: Need for 3-Dimensional Imaging, Techniques for 3-Dimesional displaying, Parallel Projections, Perspective projection, Intensity cues, Stereoscope effect, Kinetic depth effect, Shading. **SOLID AREA SCAN CONVERSION and Three Dimensional Transformations**: Solid Area Scan Conversion, Scan Conversion of Polygons, Algorithm Singularity, Three Dimensional transformation, Translations, Scaling, Rotation, Viewing Transformation, The Perspective, Algorithms, Three Dimensional Clipping, Perspective view of Cube.

UNIT-IV

Introduction to curves: Curve Continuity, Conic Curves, Piecewise Curve Design, Parametric Curve Design, Spline Curve Representation, Bezier Curves, B-Spline Curves, Fractals and its applications. **Surface Design** : Bilinear Surfaces, Ruled Surfaces, Developable Surfaces, Coons Patch, Sweep Surfaces, Surface of Revolution, Quadric Surfaces, Constructive Solid Geometry, Bezier Surfaces, B-
Spline Surfaces, Subdivision Surfaces.

UNIT-V

Object Rendering: Introduction Object-Rendering, Light Modeling Techniques, illumination Model, Shading, Flat Shading, Polygon Mesh Shading, Gaurand Shading Model, Phong Shading, Transparency Effect, Shadows, Texture and Object Representation, Ray Tracing, Ray Casting, Radiosity, Color Models.

Introduction to animation: Key-Frame Animation, Construction of an Animation Sequence, Motion Control Methods, Procedural Animation, Key-Frame Animation vs Procedural Animation, Introduction
to Morphing, Three-Dimensional Morphing.

4.Books and Materials

Textbooks:

1. Computer Graphics, R. K. Maurya, John Wiley.

Reference Book:

1.Computer Graphics, Donald Hearn and M. Pauline Baker, Prentice Hall of India.
2.Computer Graphics, Steven Harrington, McGraw-Hill.
3.Computer Graphics Principles and Practice, J.D. Foley, A Van Dam, S. K. Feiner and R. L. Phillips, Addision Wesley.
4.Principles of Interactive Computer Graphics, William M. Newman, Robert F. Sproull, Tata McGraw-Hill.
5.Introduction to Computer Graphics, J.D. Foley, A. Van Dam, S. K. Feiner, J.F. Hughes and R.L. Phillips, Addision Wesley.
6.Mathematical elements of Computer Graphics, David F. Rogers, J. Alan Adams, Tata McGraw- Hill.
Procedural elements of Computer Graphics, David F. Rogers, Tata McGraw-Hill

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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
1	0	2	42	0	0	2	30	70	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 Social Media,Network Measures Degree Distribution, Cumulative Degree Distribution, Power law Graph Preliminaries, Clusters in Social Network Analysis Types of Clusters, Connected Components Centrality Page Rank, Hub & Authority Assortative 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 Property Synthetic Networks,Erdos-Renyi Networks Regular Ring Laticce Network model,Watts-Strogatz Network Model Barabasi-Albert Network Model Prices Network Model.

UNIT II

Preferential Attachment Model, Vertex Copying Model, Other Models-Local-World Network Growth Model, Network Model with Accelerating 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

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	30	70	100

1. COURSE OBJECTIVES:

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.

2. COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

A33150.1 Describe the fundamental topics of hacking and network connectivity.

A33150.2 Implement the tools and techniques of Ethical hacking.

A33150.3 Learn the privacy, design and secure operations using cryptographic algorithms.

A33150.4 Apply the security and integrity tools in the cryptography system

A33150.5 Improving the secure and network systems.

3. COURSE 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, hardwaretrojans.

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.

4. Books and Materials

Textbooks:

4. Data and Computer Communications -- W. Stallings.
5. Introduction to Computer Networks and Cybersecurity -- C-H. Wu and J. D. Irwin
6. 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:

2) Ethical Hacking Professional Certificate | NPTEL-12 weeks course

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	30	70	100

2. 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.

3. Course Outcomes (COs)

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

A33148.1 Understand various IoT connectivity technologies and their protocols.

A33148.2 Analyze the impact and implementation of Industry 4.0 and lean production systems.

A33148.3 Evaluate the role of augmented reality, virtual reality, AI, and big data in CPS.

A33148.4 Evaluate the feasibility and appropriateness of different business models for IIoT.

A33148.5 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, IoTNetwork QoS, IoT Data Protocols – MQTT, CoAP, AMQP, XMPP.

UNIT-2

Introduction to Industry 4.0, Industry Revolution, the Fourth Revolution, Megatrends, LEAN Production Systems – 7Types 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/

Professional Elective-V

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COURSE STRUCTURE

A30568 - Block Chain 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	30	70	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 blockchain, 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:

A30568.1 Understand and explore the process of Block chain technology in payment and funding processing.

A30568.2 Analyze the working of Smart Contracts

A30568.3 Perform basic operations in hyper ledges and block chain networks.

A30568.4 Describe and deploy the smart contracts.

A30568.5 Identify the risks involved in building Block chain applications.

3. Course Syllabus

UNIT I

Introduction, Scenarios, Challenges Articulated, Blockchain, Blockchain Characteristics, Opportunities Using Blockchain, History of Blockchain. Evolution of Blockchain: Evolution of Computer Appli cations, 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 blockchain, data storage on blockchain, wallets, coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.

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, Architecture with Blockchain Platforms, Approachfor Designing Blockchain Applications.

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, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, MyEtherWallet, Ethereum Networks/Environments, Infura, Etherscan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, Open Zeppelin Contracts

UNIT V

Hyperledger Blockchain Implementation: Introduction, Use Case Car Ownership Tracking, Hy- perledger Fabric, Hyperledger Fabric Transaction Flow, and FabCar Use Case Implementation, In- voking Chaincode Functions Using Client Application.

2. Books and Materials

TextBook(s)

1. Ambadas, Arshad Sarfaz Ariff, Sham “Block chain for Enterprise Application Developers”, Wiley publications.
2. Andreas M. Antonpoulos, “ Mastering Bitcoin: Programming the Open Blockchain”, O'Reilly 2nd edition 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

A30569 - Software Defined 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	30	70	100

1.Course Description

Course Overview

This course introduces about software defined networking, an emerging paradigm in computer network-ing that allows a logically centralized software program to control the behavior of an entire network.

Course Pre/co requisites

Computer Networks

2.Course Outcomes (COs)

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

A30569.1 Explain the key benefits of SDN by the separation of data and control planes.A30569.2

Interpret the SDN data plane devices and Open flow Protocols.

A30569.3 Implement the operation of SDN control plane with different controllers.

A30569.4 Apply techniques that enable applications to control the underlying net, work using SDN.A30569.5

Describe Network Functions Virtualization components and their roles in SDN

3. Course Syllabus

UNIT - I

SDN Background and Motivation: Evolving network requirements, The SDN Approach: Requirements, SDN Architecture, Characteristics of Software, Defined Networking, SDN and NFV, Related Standards: Standards, Developing Organizations, Industry Consortia, and Open DevelopmentInitiatives.

UNIT - II

SDN Data plane and Open Flow: SDN data plane: Data plane Functions, Data plane protocols, Open flowlogical network Device: Flow table Structure, Flow Table Pipeline, The Use of Multiple Tables, Group Table Open Flow Protocol.

UNIT - III

SDN Control Plane: SDN Control Plane Architecture: Control Plane Functions, Southbound Inter, face, Northbound Interface, Routing, ITU,T Model, Open Day light, REST, Cooperation and Coordination amongControllers.

UNIT - IV

SDN Application Plane: SDN Application Plane Architecture: Northbound Interface, Network

Applications, User Interface, Network Services Abstraction Layer: Abstractions in SDN, Frenetic, Traffic Engineering, Measurement and Monitoring, Security, Data Center Networking, Mobility and Wireless.

UNIT - V

Network Functions Virtualization: Background and Motivation for NFV, Virtual Machines, NFV Concepts: Simple Example of the Use of NFV, NFV Principles, High, Level NFV Framework, NFV Benefitsand Requirements, NFV Reference Architecture: NFV Management and Orchestration.

Books and Materials

Text Book(s)

1.William Stallings, “Foundations of Modern Networking”, Pearson Ltd., 2016.
2.Software Defined Networks: A Comprehensive Approach by Paul Goransson and ChuckBlack, Morgan Kaufmann Publications, 2014
3.SDN , Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013

Reference Book(s)

1.Feamster, Nick, Jennifer Rexford, and Ellen Zegura. "The road to SDN: an intellectual history of programmable networks." ACM SIGCOMM Computer Communication Review 44.2(2014): 87,98.
Kreutz, Diego, et al. "Software, defined networking: A comprehensive survey." Proceedings

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COURSE STRUCTURE

A30570- 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	30	70	100

1.Course Description

Course Overview

This Deep Learning is a subfield of machine learning that focuses on training artificial neural networks to perform tasks that require human-like perception and decision-making. This course introduces students to the fundamental concepts, algorithms, and applications of deep learning. It covers various neural network architectures, training techniques, and practical use cases across domains such as computer vision, natural language processing, and reinforcement learning.

Course Pre/co requisites

Machine learning concepts and algorithms.

2.Course Outcomes (COs)

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

A30570.1 : To understand the theoretical foundations, algorithms and methodologies of Neural Network

A30570.2 : To design and develop an application using specific deep learning models

A30570.3 : To provide the practical knowledge in handling and analysing real world applications.

A30570.4 : To enhance the Encoder and Decoder sequence to sequence

A30570.5 :To design the Automatic Image captioning in Deep learning

1. Course Syllabus

UNIT – I: INTRODUCTION TO DEEP LEARNING

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks,Gradient - Based learning, Hidden Units, Architecture Design, Back-Propagation networks.

UNIT – II: **DEEP LEARNING ARCHITECTURES**

Machine Learning and Deep Learning, Representation Learning, Width and Depth of NeuralNetworks Activation Functions: RELU, LRELU, ERELU, Unsupervised Training of NeuralNetworks, Restricted Boltzmann Machines.

UNIT – III: **CONVOLUTIONAL NEURAL NETWORKS**

CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT – IV : RECURRENT AND RECURSIVE NETS

Recurrent Neural Networks, Bidirectional RNNs, Encoder-decoder sequence to sequence architectures - BPTT for training RNN, Long Short Term Memory Networks.

UNIT – V: **DEEP LEARNING APPLICATIONS**

Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with GenerativeAdversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision

2. Books and MaterialsText

Book(s)

4. William Stallings, “Foundations of Modern Networking”, Pearson Ltd., 2016.
5. Software Defined Networks: A Comprehensive Approach by Paul Goransson and ChuckBlack, Morgan Kaufmann Publications, 2014
6. SDN , Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013

Reference Book(s)

3. Feamster, Nick, Jennifer Rexford, and Ellen Zegura. "The road to SDN: an intellectual history of programmable networks." ACM SIGCOMM Computer Communication Review 44.2(2014): 87,98.
4. Kreutz, Diego, et al. "Software, defined networking: A comprehensive survey." Proceedings

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COURSE STRUCTURE

A30571 - DISTRIBUTED 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

Distributed computing is a field of computer science that deals with designing, implementing, and managing systems composed of multiple interconnected computers or nodes that work together to achieve a common goal. This course introduces students to the principles, techniques, and challenges of distributed computing, covering topics such as distributed systems architecture, communication protocols, distributed algorithms, and practical applications.

Course Pre/co requisites

A30571 Computer Networks and Operating Systems

2.Course Outcomes (COs)

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

A30571.1 To expose students to both the abstraction and details of file systems
A30571.2 To introduce concepts related to distributed computing systems.
A30571.3 To focus on performance and flexibility issues related to systems design decisions.
A30571.4 To understand why and not just the memorize the details
A30571.5 To expose students to current literature in distributed systems.

3.Course Syllabus

UNIT – I : INTRODUCTION TO DISTRIBUTED COMPUTING

Evolution of Distributed Computing Systems, System models, issues in design of Distributed Systems,Distributed computing environment, web based distributed model, computer networks related to distributed systems and web based protocols.

UNIT – II : MESSAGE PASSING

Inter process Communication, Desirable Features of Good Message-Passing Systems, Issues in IPC by Message, Synchronization, Buffering, Multi datagram Messages, Encoding and Decoding ofMessage Data, Process Addressing, Failure Handling, Group Communication.

UNIT – III : REMOTE PROCEDURE CALLS

The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, Lightweight RPC, Optimization for Better Performance.

UNIT – IV: DISTRIBUTED SHARED MEMORY

Design and Implementation issues of DSM, Granularity, Structure of Shared memory Space, Consistency

Models, replacement Strategy, Thrashing, Other Approaches to DSM, Advantages of DSM.Synchronization - Clock Synchronization, Event Ordering, Mutual Exclusion, Election Algorithms.

UNIT – V : DISTRIBUTED FILE SYSTEMS

Desirable Features of a good Distributed File Systems, File Models, File Accessing Models, File-sharingSemantics, File caching Schemes, File Replication, Fault Tolerance, Design Principles, Sun's network file system, Andrews file system, comparison of NFS and AFS.

3. Books and Materials

Text Book(s)

1. **Distributed Systems: Concepts and Design,, 5th Edition, George Coulouris, JeanDollimore, Tim Kindberg, and Gordon Blair, Addison-Wesley Publishers, 2012**

Reference Book(s):

1.Java Network Programming and Distributed Computing, David Reilly and MichaelReilly, Addison Wesley, 2005

2.Apache Kafka: A High-Throughput Distributed Messaging System

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COURSE STRUCTURE

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	30	70	100

A30591 – Cyber Security and Privacy

2. COURSE OBJECTIVES:

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.

3. COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

A30591.1 Describe the fundamental topics of hacking and network connectivity.

A30591.2 Implement the tools and techniques of Ethical hacking.

A30591.3 Learn the privacy, design and secure operations using cryptographic algorithms.

A30591.4 Apply the security and integrity tools in the cryptography system

A30591.5 Improving the secure and network systems.

4. COURSE SYLLABUS

UNIT I

Introduction to cyber security: Confidentiality, Integrity and Availability. Foundations, Fundamental concepts, CIA, CIA triangle, data breach at target, Security management.

UNIT II

Governance, risk, compliance: (GRC)- GRC framework, security, Contingency planning, Incidence response,
Disaster Recovery, BCP, Cyber security policy, ESSP, Risk Management.

UNIT III

Cyber Risk Identification: Assessment and Control, Cyber security in Industry perspective, defence Technologies Attack, Exploits, Information privacy, Theories.

UNIT IV

Cyber security technologies: Access control, Encryption, Standards. Foundations of privacy, Measurement,
Privacy regulation-privacy, Anonymity, Regulation.

UNIT V

Data Breach: Privacy regulation in Europe,Privacy, The Indian Way - Data Protection, GDPR, DPDP, Aadhar,
Economics and strategy, Economic value of privacy, privacy valuation, WTA and WTC, Business strategy and privacy,Espionage, Privacy vs safety.

4. Books and Materials

Text Book:

Michael E. Whitman, Herbert J. Mattord, (2018). Principles of Information Security, 6th edition,

Cenage Learning, N. Delhi.

References:

1.Darktrace, “Technology” https://www.darktrace.com/en/technology/#machine-learning, accessed November 2018.

2.Van Kessel, P. Is cyber security about more than protection? EY Global Information Security Survey 2018-2019.

3.Johnston, A.C. and Warkentin, M. Fear appeals and information security behaviors: An empirical study. MIS Quarterly, 2010.

4.Arce I. et al. Avoiding the top 10 software security design flaws. IEEE Computer Society Center for Secure Design (CSD), 2014.

COURSE STRUCTURE

A30592-COMPUTER ARCHITECTURE

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 is an introductory computer architecture course for beginners. We will start out with a discussion on binary representations, and a discussion on number systems (1's complement and 2's complement). Then, the course will move on to discuss assembly languages, and computer arithmetic. Once, we are done with the fundamentals, we shall look at the design of a simple processor, concepts of pipelining, and the design of a modern memory system.

2.Course Outcomes(CO's)

A30592.1 Understand the basics of computing systems, and efficiently perform conversions between number systems and represent real numbers using floating-point notation.

A30592.2 Develop and write low-level programs in assembly language, utilizing various instructions and addressing modes to interface with hardware components

A30592.3 Apply efficient algorithms for binary arithmetic operations such as addition, multiplication, and division, optimizing performance in digital systems.

A30592.4 Design and analyze basic processor architectures and implement pipelining techniques to improve instruction throughput and handle pipeline hazards effectively.

A30592.5 Demonstrate an understanding of memory hierarchy, including cache and virtual memory systems, and apply techniques to optimize memory access and management.

3.Course Syllabus

UNIT I

Introduction to Computing,Number Systems,Floating Point Numbers.

UNIT II

Assembly Language – I,Assembly Language – II.

UNIT III

Algorithms for Binary Addition,Algorithms for Multiplication and Division.

UNIT IV

Processor Design,Pipelining – I,Pipelining – II.

UNIT V

Memory Systems – Caches,Virtual Memory.

Books and references

Computer Organisation and Architecture, Smruti R. Sarangi, McGrawHill (2015)

Course Structure

A30593–MACHINE LEARNING AND DEEP LEARNING - FUNDAMENTALS AND APPLICATIONS

HoursPerWeek			HoursPerSemester			Credits	AssessmentMarks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. CourseDescription

CourseOverview

This course provides a comprehensive introduction to machine learning and deep learning, focusing on both theoretical foundations and practical implementations. The curriculum is designed to cover fundamental concepts, advanced techniques, and modern trends in machine learning, guiding students through a progressive journey from basic regression models to complex neural network architectures and state-of-the-art deep learning techniques**.**

CoursePre/Co-requisites

Thecoursehasnospecificprerequisiteandco-requisites.

2. CourseOutcomes(COs)

Aftercompletionofthecourse,thelearnerwillbeable to:

A30593.1	: Understanding Fundamentals of Machine Learning and Bayesian Methods
A30593.2	Apply Parametric and Non-Parametric Methods for Data Estimation.
A30593.3	Demonstrate Ensemble Methods and Dimensionality Reduction Techniques.
A30593.4	Analyze and Implement Clustering and Mixture Models
A30593.5	Understand and Apply Neural Networks and Deep Learning Architectures.

3. CourseSyllabus

Unit 1:

Fundamentals of Machine Learning Introduction to ML: Overview of Machine Learning, Performance Measures, Bias-Variance Trade-off Linear Regression

Bayesian Methods: Bayes Decision Theory,Normal Density and Discriminant Function

Bayes Decision Theory with Binary Features,Bayesian Belief Networks

Unit 2:

Estimation, Discriminative Models, and Decision Trees Parametric and Non-Parametric Estimation: Maximum Likelihood (ML) and Bayesian Estimation,Parametric vs Non-Parametric Density Estimation (Parzen Window, KNN)

Discriminative Models and SVM: Perceptron Criteria, Discriminative Models, Support Vector Machines (SVM).

Logistic Regression and Decision Trees: Logistic Regression,Decision Trees,Hidden Markov Model (HMM)

Unit 3:

Ensemble Methods and Dimensionality Reduction Ensemble Methods: Ensemble Strategies: Boosting, Bagging, Random Forest

Dimensionality Reduction: Principal Component Analysis (PCA),Linear Discriminant Analysis (LDA)

Unit 4:

Clustering and Mixture Models Clustering Techniques: K-Means Clustering, Fuzzy K-Means Clustering, Hierarchical Agglomerative Clustering, Mean-Shift Clustering

Mixture Models: Concept of Mixture Models, Gaussian Mixture Models (GMM),Expectation-Maximization (EM) Algorithm

Unit 5:

Neural Networks and Deep Learning Neural Networks: Perceptron, Multilayer Network, Back propagation, Radial Basis Function (RBF) Networks

Introduction to Deep Learning: Convolutional Neural Networks (CNN),Vanishing and Exploding Gradients, Deep Learning Architectures: LeNet-5, Alex Net, Vignette, Google Net, ResNet

Recent Trends in Deep Learning: Generative Adversarial Networks (GAN),Autoencoders and Relation to PCA,Recurrent Neural Networks (RNN),U-Net, Applications and Case Studies

4. Books and Materials

TextBook(s)

1. E. Alpaydin, Introduction to Machine Learning, 3rd Edition, Prentice Hall (India) 2015.
2. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification, 2nd Edn., Wiley India, 2007.
3. C. M. Bishop, Pattern Recognition and Machine Learning (Information Science and Statistics),Springer, 2006.
4. M.K. Bhuyan, Computer Vision and Image Processing: Fundamentals and Applications, published by CRC press, USA, 2019.
5. S. O. Haykin, Neural Networks and Learning Machines, 3rd Edition, Pearson Education (India), 2016.
6. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016
7. Michael A. Nielsen, Neural Networks and Deep Learning , Determination Press, 2015
8. Yoshua Bengio, Learning Deep Architectures for AI, now Publishers Inc., 2009

OPEN ELECTIVES

Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A31081	Basic Civil Engineering	3-0-0	3	CE
A31082	Building Planning and Construction	3-0-0	3	CE
A31083	Disaster Management	3-0-0	3	CE
A31084	Water Resources Conservation	3-0-0	3	CE
A32081	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A32082	Renewable Energy Sources	3-0-0	3	EEE
A32083	Electrical Measuring Instruments	3-0-0	3	EEE
A33081	Optimization Techniques	3-0-0	3	ME
A33082	Mechanical Technology	3-0-0	3	ME
A33083	Introduction to Automobile Systems	3-0-0	3	ME
A34081	Basic Electronics	3-0-0	3	ECE
A34082	Introduction to Communication Systems	3-0-0	3	ECE
A34083	Fundamentals of IoT	3-0-0	3	ECE
A35081	Basic Data Structures	3-0-0	3	CSE
A35082	Fundamentals of DBMS	3-0-0	3	CSE
A35083	Basics of Software Engineering	3-0-0	3	CSE
A35084	Python for Everyone	3-0-0	3	CSE
A35085	Computer Organization and Operating Systems	3-0-0	3	CSE
A35086	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A30081	Management Science	3-0-0	3	H&S
A30082	Research Methodology	3-0-0	3	H&S
A30083	Intellectual Property Rights	3-0-0	3	H&S
A30084	National Service Scheme	3-0-0	3	H&S
A30085	Yoga	3-0-0	3	H&S
A30086	Design Thinking	3-0-0	3	H&S
A30091	Management Information Systems	3-0-0	3	H&S
A30089	Business to Business Marketing(B2B)	3-0-0	3	H&S
A30093	Human Factors Engineering	3-0-0	3	H&S
A30094	Basic Environmental Engineering And Pollution Abatement	3-0-0	3	H&S
A30474	Introduction to IoT	3-0-0	3	ECE

COURSE STRUCTURE

A31081 – 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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A31081.1	Classify various materials and components used in building construction
A31081.2	List out different domains like Structural, Transportation and Geotechnical Engineeringin Civil engineering stream
A31081.3	Identify types of soils and foundations for various structures
A31081.4	Measure the linear and angular parameters using concepts of surveying
A31081.5	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 PunmiaLal,*Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi, 16th edition, 2005.

COURSE STRUCTURE

A31082 – BUILDING PLANNING & 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 abuilding& 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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A31082.1	Plan buildings by adhering to laws laid by regulatory bodies
A31082.2	Classify different masonry types of brick and stones used in construction
A31082.3	Select appropriate floors and roofs for a proposed building
A31082.4	Identify building materials which can be employed in construction
A31082.5	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, Location of doors and windows, definition of technical terms, size of doors and windows, types of doors and windows, ventilators, fixtures and fastenings.

UNIT-V

Damp proofing: Introduction, Causes and effects of dampness on buildings, materials and methods used for

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. Dr.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.

COURSE STRUCTURE

A31083 – 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/co requisites

The course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

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

A31083.1	Classify different kind of hazards/disasters and their effects on environment
A31083.2	Analyze the causes of hazards/disasters which effects human life
A31083.3	Apply disaster management through engineering applications
A31083.4	Apply suitable mitigation measures to minimize the effects of hazards and disasters

3. Course Syllabus

UNIT I : Environmental Hazards &Disasters:

Environmental Hazards & Disasters: Meaning of Environmental hazards,
Environmental, Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology, Landscape Approach – Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT II

Types of Environmental hazards & Disasters: Types of Environmental hazards & Disasters: Natural hazards and Disasters, Man induced hazards & 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 & 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 & Local storms, Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts- Cold waves- Heat waves. Floods: - Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & 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 & forms of Soil Erosion, Factors & 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 & Environmental problems- Corrective measures of Erosion & 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.

COURSE STRUCTURE

A31084 – 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/co requisites**

The Course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A31084.1 Interpret ground and surface water utilization for conservation of water resources A31084.2 Apply the concepts of artificial ground water recharge to increase ground water level

A31084.3 Make use of the concepts of harvesting for preservation of water

A31084.4 Utilize new technologies like ion exchange and UV radiation techniques to recycle and reuse waste water

A31084.5 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 & 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

4. Books and Materials

Text Book(s)

1. Ramakrishnan S. *Ground water*, Sci -Tech Publications, 2nd edition, 2010.

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

A32081 – 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/co requisites

The course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

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

A32081.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A32081.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems. A32081.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A32081.4 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.

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

Network Theorems: Thevenin's, Norton's, Superposition and Maximum Power Transfer Theorems (DC Excitation only).

UNIT IV

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.

UNIT V

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.

1-phase Transformers: Principle of Operation, Constructional Details, E.M.F. equation, Losses and efficiency, OC& SC Tests.

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.

COURSE STRUCTURE

A32082 – 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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A32082.1 Apply the principles of Renewable energy sources for the construction of Power generating station.

A32082.2 Analyze the various energy conversion systems and their limitations. A32082.3

Analyze Renewable energy sources for various environmental conditions

A32082.4 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 & Applications: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Storage & 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 & 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.

COURSE STRUCTURE

A32083 – ELECTRICALMEASURING 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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A32083.1	Categorise various electrical instruments used for measuring electrical parameters.
A32083.2	Design appropriate arrangement for extension of range in measuring instruments.
A32083.3	Analyze the errors and compensations in various electrical measuring instruments
A32083.4	Measure current, voltage, power and energy in 1-phase and 3-phase circuits
A1283.5	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

Instrument transformers: Current Transformer and Potential Transformer, ratio and phase angle error, error compensation problems.

UNIT III

Potentiometers: Principle and operation of D.C. Crompton's potentiometer, standardization, Measurement of unknown resistance, current, voltage.

UNIT IV

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.

Measurement of Energy: Single phase induction type energy meter, driving and braking torqueserrors 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.

COURSE STRUCTURE

A33081 – 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/co requisites

The course has no specific prerequisite and Co requisite

2. Course Outcomes (COs)

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

A33081.1 Apply various Operations Research models and methods to real world problems.

A33081.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A33081.3 Evaluate various alternatives available to find optimal solution for real world problems.

A33081.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A33081.5 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 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. HamdyAbdelazizTaha,*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

A33082 – 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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A33082.1 Identify the types of engines and their cycles.

A33082.2 Classify the reciprocating air compressors and their working principles.

A33082.3 Discus the constructional features of domestic refrigeration and air conditioning systems.

A33082.4 Inspect the mechanism of power transmission elements of various engineering systems. A33082.5 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

A33083 – INTRODUCTIONTO AUTOMOBILE 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 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:

A33083.1 Identify the different parts of the automobile systems used in daily life.

A33083.2 Analyze brakes, steering, axles, suspension and frames of an engine for better performance.

A33083.3 Inspect the mechanism of power transmission elements, and applications of various engineering systems.

A33083.4 Compare the significance of various engines in terms of their performance.

A33083.5 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

A34081 – BASIC 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 fundamentals of electronics and an understanding of a range of discrete semiconductor devices, including design, construction and testing of experimental electronic devices. This course makes the students, get expertise in analyzing principle of operation of p-n junction diode, special diodes, rectifiers, BJT and FET.

Course Pre/co requisites

A30003 –Engineering Physics

2. Course Outcomes (COs)

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

A34081.1	Analyze the operation and characteristics of diodes and transistors.
A34081.2	Analyze various applications of diodes and transistors.
A34081.3	Make use of Boolean algebra postulates to minimize boolean functions.
A34081.4	Construct and analyze various combinational and sequential circuits used in digital systems.

3. Course Syllabus

UNIT I

Diode: Formation, forward and reverse bias, V-I characteristics, application as a switch, V-I characteristics of Zener diode, Zener diode as a regulator.

UNIT II

Rectifiers: Construction, operation of Half wave, Full wave and Bridge rectifier.

Transistors: formation, types, configurations, applications of BJT, FET, MOSFET.

Amplifiers: Basics, different types of amplifiers and their applications in public addressing systems.

UNIT III

Number systems: Review of number systems and their conversions, Representation of negative numbers, binary codes.

UNIT IV

Boolean algebra: Theorems and properties, canonical and standard forms of SOP/POS form, digital logic gates, universal gates.

UNIT V

Combinational circuits: basic logic gates, adders, subtractors, multiplexers and comparators.

Sequential circuits: SR, JK, T, and D latches and flip-flops.

4. Books and Materials

Text Book(s)

1. J. Millman, C. Halkias, *Electronic Devices and Circuits*, TMH, 4th edition, 2010.
2. M. Morris Mano, Michael D. Ciletti, *Digital Design*, 4th edition, Pearson Education/PHI, India, 2008.

Reference Book(s)

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, Pearson Publications, 9thedition, 2006.
2. J.B. Gupta, *Electronic Devices and Circuits*, 3rd Edition, S.K. Kataria& Sons, 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A34082 – INTRODUCTION TO 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 concepts of communication systems such as signals, modulation, demodulation and multiplexing. This course also provides different modulation techniques used in analog and digital communication systems. In this course, students also learn about the operation of AM and FM receivers.

Course Pre/co requisites

The course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

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

A34082.1	Analyze the operation of basic communication system.
A34082.2	Compute the Fourier transform, energy and power of communications signals.
A34082.3	Compare the performance of different modulation schemes used in communication systems
A34082.4	Differentiate time division and frequency division multiplexing techniques.
A34082.5	Select an appropriate modulation technique while designing a communication system.

3. Course Syllabus

UNIT I

Operations on signals: Fourier series, Fourier transform, Energy, Power, Bandwidth, Sampling.
Communication Systems: Components, Analog and digital messages, channel effect, signal to noise ratio and capacity.

UNIT II

Modulation and Detection: Definition, transmission, multiplexing, demodulation.
Amplitude Modulation: Time domain representation, spectrum of AM, single tone AM, modulation and demodulation of DSB, DSBSC, SSB, VSB.

UNIT III

Angle Modulation: Phase modulation, Frequency Modulation.
Pulse Modulation: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).

UNIT IV

Digital Modulation schemes: ASK, FSK, PSK, M-ary PSK, QPSK.

UNIT V

Receivers and Multiplexing: AM receiver, FM receiver, Frequency-Division Multiplexing (FDM), Time-Division Multiplexing (TDM).

4. Books and Materials

Text Book(s)

1. Simon Haykin and Michael Moher. *Introduction to Analog and Digital Communications*, JOHN WILEY & SONS, INC., 2nd edition, 2007.
2. B.P. Lathi and Zhi Ding. *Modern Digital and Analog Communication Systems*, Oxford University Press, 4th edition, 2010.

Reference Book(s)

1. Sham Shanmugam. *Digital and Analog Communication Systems*, Wiley-India edition,2006.

2. A. Bruce Carlson, and Paul B. Crilly. *Communication Systems,An Introduction to Signalsand Noise in Electrical Communication*, McGraw-Hill International Edition,5th edition, 2010.

3. Herbert Taub and Donald L Schilling. *Principles of Communication Systems*, Tata McGraw-Hill,3rdedition,2009.

COURSE STRUCTURE
A34083 – 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/co requisites

The course has no specific prerequisite and co requisites.

2. Course Outcomes (COs)

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

A34083.1 Analyze IoTapplications using IoT enablers and connectivity layers, components.

A34083.2 Distinguish sensors and actuators in terms of their functions and applications.

A34083.3 Interface I/O devices, Sensors using Arduino UNO.

A34083.4 Develop Raspberry Pi Interfacing programs using python concepts.

A34083.5 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, 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

A35081 –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/Co requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

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

A35081.1 Analyze the time and space complexities of algorithms

A35081.2 Apply various operations on linear data structures

A35081.3 Design searching and sorting techniques for a given application

A35081.4 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. **Search-** Sequential Search, Binary Search, time complexity.

UNIT V

Trees and Graphs: Trees- Examples, Vocabulary and Definitions, Binary Tree Applications, Tree Traversals, Binary Search Trees. **Graph-** Vocabulary and Definitions, Applications: BFS and DFS.

4. Books and Materials

Text Book(s)

1. Debasis Samanta. *Classic Data Structures*. Second Edition, PHI, 2014.

Reference Book(s)

1. G A VijayalakshmiPai. *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

A35082 – 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	30	70	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/Co requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

A35082.1	Apply suitable data models for given application
A35082.2	Design database using integrity constraints and ACID properties
A35082.3	Construct optimized SQL queries to solve real time problems
A35082.4	Apply suitable normal form to eliminate data redundancy A35082.5
	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, S.Sudarshan ,*Database System Concepts*, McGraw Hill, 6th edition, 2012.
2. RamezElmasri, Shamkat B. Navathe, *Database Systems,* Pearson Education, 6th edition 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A35083 – 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/Co requisites

The course has no specific prerequisite and co requisites.

2. Course Outcomes (COs)

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

A35083.1 Apply the phases of software development life cycle in application development

A35083.2 Identify software requirements for construction

A35083.3 Design requirement engineering process for change management

A35083.4 Apply the design concepts for design models

A35083.5 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.

COURSE STRUCTURE

A35084 –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	30	70	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/Co requisites

The course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

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

A35084.1 Apply the basic constructs of Python to solve problems

A35084.2 Organize lists, tuples and dictionaries appropriately to solve complex problems

A35084.3 Build functions to increase code reusability

A35084.4 Implement modular programming for organized software development

A35084.5 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 NamdevKamthane, 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. ReemaThareja. *Python programming using problem solving approach*. Oxford, 2019.

COURSE STRUCTURE

A35085 – 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/Co requisites

The course has no specific prerequisite and co requisites.

2. Course Outcomes (COs)

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

A35085. 1	Analyze the fundamentals of computer organization in designing a system
A35085.2	Apply the concepts of programming language to solve system problems
A35085.3	Make use of the Operating Systems design structure and its services for system programming
A35085.4	Develop Process Scheduling algorithms and Inter-Process Communication systems for resource management
A35085.5	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

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, and 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.

COURSE STRUCTURE

A35086 – 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/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:

A35086.1 Analyze different fields in which AI is applied

A35086.2 Apply suitable search strategies in finding better solution for a given problem

A35086.3 Identify linear regression with single and multiple variables

A35086.4 Perform predictive analysis using decision trees and random forest classifier

A35086.5 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: Introduction, The Fundamentals of Classification, Classification with Support Vector Machines, Introduction to Decision Trees, Random Forest Classifier.

UNIT V

Machine Learning with Neural Networks: Introduction, Machine Learning Types, TensorFlow for Python, Introduction to Neural Networks, Deep Learning.

4. Books and Materials

Text Book(s)

1. Zsolt Nagy, *Artificial Intelligence and Machine Learning Fundamentals*, Pack 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.

COURSE STRUCTURE

A30081 – MANAGEMENTSCIENCE

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	30	70	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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A30081.1 Apply the concepts, theories, and principles of management in professional life.

A30081.2 Design suitable organization structure for managing the operations in the organization.

A30081.3 Apply principles of management to the various functional areas of an organization such as Human Resource, Marketing and Production.

A30081.4 Evaluate cost and time of each business project by using PERT and CPM techniques.

A30081.5 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 (Simple Problems).

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)

1. 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
A30082 – RESEARCHMETHODOLOGY

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	30	70	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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A30082.1	Interpret the importance of literature survey to identify the research problem.
A30082.2	Develop suitable research methodologies to conduct engineering research.
A30082.3	Apply the principles of research to gather the required data from various sources
A30082.4	Evaluate the gathered data by using appropriate statistical techniques.
A30082.5	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: Chisquare, student's t-test, Regression modelling, Direct and Interaction effects, ANOVA, F-test, Time Series analysis, Autocorrelation and Autoregressive modelling.

UNIT - V

Research Report Writing: Format of the Research report, Synopsis, Dissertation, Thesis its Differentiation, References/Bibliography/Web bliography, 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)

2. C.R Kothari, Research Methodology, Methods & Technique; Hyderabad: New Age International Publishers, 2004.
3. R. Ganesan, Research Methodology for Engineers, New Delhi: MJP Publishers, 2011.
4. RatanKhananabis and SuvasisSaha, Research Methodology, Universities Press, Hyderabad, 2015.
5. Y. P. Agarwal, Statistical Methods: Concepts, Application and Computation, Sterling Publications Pvt., Ltd., New Delhi, 2004.

COURSE STRUCTURE

A30083- 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/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A30083.1	Analyse ethical and professional issues which arise in the intellectual property law context.
A30083.2	Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.
A30083.3	Analyse the social impact of intellectual property law and policy.
A30083.4	Make use of copy righted material so that it does not obstruct the progress of human knowledge.
A30083.5	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 Trade Marks, 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 Bansl& 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. PrabuddhaGanguli, *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).

COURSE STRUCTURE

A30084 –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/co requisites

This course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A30084.1	Classify the organizational structure of NSS and its activities.
A30084.2	Identify the methods of mobilization and importance of youth Leadership.
A30084.3	Develop a sense of social and civic responsibility and provide solutions to individual and community problems
A30084.4	Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions.
A30084.5	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, sharamadn 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, by. 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

A30085 – 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	30	70	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/co requisites

There is no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A30085.1 Improve physical conditioning related to flexibility through participation in yoga.

A30085.2 Develop and maintain a personal yoga practice.

A30085.3 Recognize and apply the value and benefits of an on-going yoga practice

A30085.4 Select as an as appropriate for personal needs

A30085.5 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, Yogic Diet.

4. Books and Materials

References:

1. Georg Feuerstein (2002) The Yoga Tradition: Its History, Literature, Philosophy and Practice. New Delhi. Bhavana Books & Prints.
2. Joshi, K.S. (1985) Yoga in daily life, Delhi: Orient paper backs
3. Taimni I.K. (1961/1999) The Science of Yoga (The Yoga Sutras of Patanjali),The Theosophical Publishing House, Adyar.

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COURSE STRUCTURE
A30086 - 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	30	70	100

4. **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 behaviours (towards the designs), and
(4) design contexts.

Course Pre/co requisites

This course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A30086.1	Appreciate various design processes for creativity and innovation
A30086.2	Develop design ideas through different techniques
A30086.3	Identify the significance of reverse engineering about products
A30086.4	Make use of design drawings to communicate ideas effectively
A30086.5	Build organizations that support creative and innovative thinking

5. **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.

3. 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 Book(s) 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 https://www.mindtools.com/brainstm.html
4. https://www.quicksprout.com/...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=2mjSDIBaUIMthevirtualinstructor.com/fore shortening.html
6. https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdfwww.bizfilings.com› Home › Marketing› Product Development https://canvas.uw.edu/courses/1023376/assignments/syllabus

HoursPerWeek			HoursPer Semester			Credits	AssessmentMarks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	42	0	0	2	30	70	100

1. Course Description

The objective of this course focuses on the design, implementation and management of information systems in organizations. It integrates technology, people, and processes to provide effective solutions for business operations and decision-making. The course provides a deep understanding of how information systems support organizational functions, improve business processes, and drive strategic initiatives.

2.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
- TechnologiesareshapingmodernITinfrastructuresanddrivinginnovation
- Understand and Apply Knowledge Management Principles

3.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 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

4.Books and references

1. KennethC.Laudon&JaneP.Laudon.“ManagementInformationSystems”.PearsonPublishing.
2. ReadingmaterialfromHarvardBusinessSchoolRepository

COURSESTRUCTURE

A30089– BUSINESS TO BUSINESS MARKETING (B2B)

HoursPerWeek	HoursPer Semester	Credits	AssessmentMarks

L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	42	0	0	2	30	70	100

1.Course Description

The objective of this course focuses course typically focuses on the strategies and techniques used to market products and services from one business to another, as opposed to selling directly to consumers (B2C)

2.Course Outcomes(COs)

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

- Understand the key differences between B2B and B2C marketing, and how they influence marketing strategies in business markets.
- Analyze the organizational buying process and apply models like the Buygrid framework to influence purchasing decisions.
- Develop and implement effective marketing strategies for industrial products and services, considering unique B2B market characteristics.
- Segment business markets and design targeted positioning strategies to differentiate products in competitive B2B environments.
- Apply forecasting methods to estimate demand for industrial products and manage new product development in B2B markets.

3.Course Syllabus

UNIT-I

Introduction to B2B Marketing: Business Marketing-Classifying goods for the business market-Business market customers- Market Structure-Environment and Characteristics of Business Marketing-Strategic role of marketing- Commercial enterprises- Commercial and institutional customers-B2B vs B2C Marketing.

UNIT-II

Organizational Buying and Buyer Behaviour: Organizational buyers' decision process - A Stepwise Model and A Process Flow Model, Organizational and business markets - Government as a customer - Commercial enterprises - Commercial and institutional customers, Value analysis, Buygrid framework-Strategic procurement.

UNIT-III

B2B Marketing Strategy: Strategy making and strategy management process, Industrial product strategy– Managing Products for Business Markets-Managing Services for Business Markets-Managing Business Market Channels Growth-Share Matrix, Multifactor Portfolio Matrix, The Balanced Scorecard.

UNIT-IV

B2B Marketing STP: Market Segmentation, bases for segmenting business markets, basic framework of segmentation- choosing target segments and positioningBusiness Marketing Communications- B2B Advertising, Digital marketing,- Trade shows-exhibitions-business meets - Managing the sales force - Deployment analysis-Direct marketing.

UNIT-V

Demand Forecasting: Industrial market-Forecasting- meaning, importance and relevance, issues related to forecasting, forecasting measurement models, sales force forecasting, estimating segment demand, Collaborative approach to estimate demand, qualitative and quantitative forecasting methods. Product management- (existing and new) in industrial market, role of product in the industrial market, new product development, industrial product life cycle,

product evaluation matrix, techniques for indentifying new products QFD, perceptual mapping, reverse engineering, fish bone diagram, role of service and maintenance in industrial markets, customer experience life cycle, service

Reference Books:

1. Business Market Management Understanding, Creating and Delivering Value By James C. Anderson, Das Narayandas, James A. Narus and D.V.R. Seshadri Pearson, 2010 3rd edition
2. Business Marketing Management b2b By Hutt and Speh South-Western CENGAGE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	42	0	0	2	30	70	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.

2.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

3.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, IndustrialApplication: 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, SixthEdition
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

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HoursPerWeek			HoursPerSemester			Credits	AssessmentMarks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	42	0	0	2	30	70	100

1. Course Description

The Basic Environmental Engineering and Pollution Abatement course covers the basics of environmental engineering and how it can be used to control pollution.

2.Course Outcomes(COs):

CO1: Explain the fundamental principles of ecology, the importance of biodiversity.
CO2: Differentiate between various types of pollution (air, water, soil) and their sources, and understand their impacts on the environment and health.
CO3: Explain the key environmental laws and regulations, and how they are applied to ensure compliance and environmental protection.
CO4: Design and evaluate systems and technologies for controlling and reducing air pollution.
CO5: Develop and apply strategies for managing solid waste, including transformation methods and hazardous waste management.

3. Course Syllabus:

UNIT-1:

Introduction; Ecology, environment and biodiversity; Ecosystem services and its risk 1; Ecosystem services and its risk 2; Pollution types and sources; Impact/consequences of pollutants; Transmission of pollutants in environment 1; Transmission of pollutants in environment 2.

UNIT-2:

Ambient air quality and standards; Water quality and standards 1; Water quality and standards 2; Industrial pollution and standards; Sampling and Characterization of gas/air/emission; Sampling and Characterization of water/waste water; Characterization of solid wastes and soil; Environmental law and regulatory framework.

UNIT-3:

Pollution prevention strategies and processes 1; Pollution prevention strategies and processes 2; Pollution prevention by using optimum water 1; Pollution prevention by using optimum water 2;
Air pollution control 1; Air pollution control 2; Air pollution control 3; Air pollution control
Treatment of surface and ground water for drinking water generation; Treatment of domestic and industrial waste water: Schemes; Primary treatment equipment; Secondary treatment process.

UNIT-4:

Secondary treatment equipment 1; Secondary treatment equipment 2; Advances in secondary treatment process 1; Advances in secondary treatment process 2; Tertiary treatment 1; Tertiary treatment 2; Sludge management; Pollution control in industry; Industrial pollution control in GPI 1; Industrial pollution control in GPI 2; Industrial pollution control in GPI 3; Industrial pollution control in GPI 4.

UNIT-5:

Industrial pollution control in GPI 5 Solid waste management schemes; Solid waste transformation 1(incineration); Solid waste transformation 2 (gasification);. Solid waste transformation 3 (Pyrolysis); Solid waste transformation 4 (Anaerobic digestion); Hazardous waste management; Management of special category wastes.

Books and references

1. "Pollution Control Acts, Rules, Notification issued there under" CPCB, Ministry of Env. And Forest, G.O.I., 3rd Ed. (2006)
2. Vallero D., "Fundamentals of Air Pollution", 4th Ed. Academic Press. (2007)
3. Eckenfelder W. W., "Industrial water pollution Control", 2nd Ed., McGraw Hill. (1999)
4. Kreith F. and Tchobanoglous G., "handbook of Solid waste Management", 2nd Ed., McGraw Hill.(2002)
5. Pichtel J., "Waste Management Practices: Municipal, Hazardous and Industrial", CRC.(2005)

6. Tchobanoglous G., Burton F. L. and Stensel H.D., “Waste Water Engineering: Treatment and Reuse”, 4th Ed., Tata McGraw Hill.(2003)

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.