

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 normally 90 working days. Odd semester commences usually in July and even semester in December of every year.

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

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

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

G. Pullaiah College of Engineering and Technology (Autonomous)

Academic Regulations

**Regulations for Four Year Bachelor of Technology (B.Tech) Degree programme for the batches
admitted from the academic year 2020-21**

&

For B.Tech Lateral Entry batches admitted from the academic year 2021 -2022

1. Award of B.Tech. Degree

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

- i. Pursues a course of study for not less than four academic years and in not more than eight academic years. However, for the students availing Gap year facility, this period shall be extended by two years at the most and these two years would not be counted in the maximum time permitted for graduation.
 - ii. Registers for 160 credits and secures all 160 credits.
 - iii. The student will be eligible to get Under graduate degree with honours or additional minor engineering if he/she completes an additional 20 credits
 - iv. A student will be permitted to register either for Honours degree or additional minor engineering but not both.
2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

3. Courses of study

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

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

4. Credits:

- i. *Credit*: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture) or two hours of practical work/field work per week.
- ii. *Academic Year*: Two consecutive (one odd + one even) semesters constitute one academic year.
- iii. *Choice Based Credit System (CBCS)*: The CBCS provides choice for students to select from the prescribed courses.

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

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

5. Course Structure

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

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

6. Weightage for course evaluation

6.1 Course Pattern

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

6.2 Evaluation Process

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

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

6.3 Internal Examinations:

- i. For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination consists of objective paper for 10 marks and subjective paper for 30 marks with duration of 1 hour 50 minutes (20 minutes for Objective paper and 90 minutes for subjective paper). The marks obtained in subjective paper will be condensed to 20 marks. The remaining 10 marks shall be awarded based on the submission of assignments by the student. A student has to submit two assignments in every subject each for 10 marks.
- ii. The objective paper shall consist of 20 objective questions each carrying 0.5 Mark.
- iii. Subjective paper shall be set for 30 marks containing 3 either or descriptive questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks.

***Note 1:** The marks obtained in the subjective paper shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark.
- iv. If the student is absent for the internal examination other than the mandatory courses, no re-exam shall be conducted and internal marks for that examination shall be considered zero.
- v. First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV and V units.
- vi. Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam and 20% to the other.

6.4 End Examinations:

End examination of theory subjects shall have the following pattern:

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

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

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

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

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

In a practical subject consisting of two parts (Eg: Electrical & Mechanical Lab), the end examination shall be conducted for 35 marks in each part. Internal examination shall be evaluated as above for 40 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

- 6.6 There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the mandatory course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.
- 6.7 For the subject having design and/or drawing, such as Engineering Drawing, the distribution shall be 40 marks for internal evaluation and 60 marks for end examination.

Day-to-day work shall be evaluated for 10 marks by the concerned subject faculty based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 40 marks with consideration of 80% weightage to the better mid exam and 20% to the other for the finalization of Internal marks. The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark. The sum of day-to-day evaluation and the internal test marks will be the final sessional marks for the subject.

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

- 6.8 There shall be five Professional Elective Courses from V Semester to VII and for each elective there shall be choices such that the student shall choose a course from the list of choice courses offered by the department for that particular elective.
- 6.9 There shall be four Open Electives/ Job Oriented Courses common to all disciplines from V Semester to VII, where in the students shall choose the electives offered by various departments including his/her own department in such a manner that he/she has not studied the same course in any form during the Programme.

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

- 6.10 There shall be a mandatory **induction program** for three weeks before the commencement of first semester.
- 6.11 **Minor in a discipline** (Minor degree/programme) concept is introduced in the curriculum for all conventional B. Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.
- a. Students who have a CGPA of 8.0 or above (up to II semester) and without any backlog subjects will be permitted to register for Minor discipline programme. A SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration active else Minor discipline registration will be cancelled.
 - b. Students aspiring for a Minor must register at the beginning of IV Semester and must opt for a Minor in a discipline other than the discipline he/she has registered in.
 - c. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects each for 4 credits and two MOOCs offered by NPTEL (notified by the Department corresponding to the Minor Programme) each for 2 credits and with a minimum duration of 8 weeks.
 - d. The student has to acquire a certificate for the concerned course from the NPTEL in order to earn 2 Credits.
 - e. Students are not allowed to register and pursue more than two courses in any semester. Students may complete the Minor before VIII semester.
 - f. Each department shall enlist a set of subjects from its curriculum which are core for the discipline without any prerequisites. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation.
 - g. Students are not allowed to pursue minor discipline programme subjects under Self-study. Classes for the courses of the minor shall be conducted beyond the regular hours. Student may enlist their choices of Minor discipline programmes in order of preference, to which they wish to join. It will not be permissible to alter the choices after the application has been submitted. However, students are allowed to opt for only one Minor discipline programme in the order of preference given by the student.

- h. Minimum strength for offering Minor in a discipline is considered One-Fifth (i.e., 20% of the class) of the class size and Maximum size is Four-Fifth of Class size (i.e., 80% of the class).
- i. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. That is, Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.
- j. The Concerned Head of the department will arrange separate course/class work and time table of the various Minor programmes. Attendance regulations for these Minor discipline programmes will be as per regular courses.
- k. A Student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor discipline programme. No class/division (i.e., second class, first class and distinction etc.) shall be awarded for Minor discipline programme.
- l. In case a student drops or fails to meet the CGPA requirement for Degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for Degree with Minor and the student will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioned the additional courses completed by them.
- m. This Minor in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in **Computer Science & Engineering** with Minor in **Electronics & Communication Engineering**. The fact will also be reflected in the transcripts, along with the list of courses for Minor programme with CGPA mentioned separately.

6.12 Honors degree in a discipline:

- a. This concept is introduced in the curriculum for all conventional B. Tech. programmes. The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.
- b. A student shall be permitted to register for Honors program at the beginning of IV Semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of second semester without any backlogs. SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Honors discipline registration active else Honors discipline registration will stand cancelled.
- c. In order to earn the Honors degree in his/her discipline, a student has to earn 20 extra credits by studying four advanced specified courses for 16 credits and acquiring the remaining 4 credits through two MOOCs offered by NPTEL which are domain specific in the branch of Engineering concerned, each for 2 credits and with a minimum duration of 8 weeks.
- d. The student has to acquire a certificate for the concerned course from the NPTEL in order to earn 3 Credits.
- e. The Evaluation pattern of theory subjects shall be similar to the regular programme evaluation.
- f. If a student drops or is terminated from the Honors program, the additional credits earned till that time cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following:
 - i. All the courses done under the dropped Honors will be shown in the transcript. (or)
 - ii. None of the courses done under the dropped Honors will be shown in the transcript.
- g. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors

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

- h. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.
- 6.13 National Service Scheme (NSS)/Yoga is compulsory for all the Undergraduate students. The student participation shall be for a minimum period of 45 hours during the first year. Grades will be awarded as Very good, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets Unsatisfactory grade, he/she has to repeat the above activity in the subsequent years along with the next year students.
- 6.14 Students shall undergo two summer internships each for a minimum of six weeks duration at the end of second and third years of the programme for 1.5 credits & 3 credits respectively. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising Head of Department and two senior faculty. The student shall submit a detailed technical report along with internship certificate from the Internship organization in order to obtain the prescribed credits. The student shall submit the Internship Project Report along with Certificate of Internship. The evaluation of the first and second summer internships shall be conducted at the end of the V Semester & VII semester respectively.

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

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

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

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

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

- 6.16 There shall be five skill-oriented courses offered during III semester to VII semester. Out of the five skill courses, two shall be skill-oriented programs related to the domain and thesetwoshall 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. Thecreditsassignedto theskill advancedcoursesshall be awarded to the studentuponproducingthe Course Completion Certificate from theagencies/professionalbodies.

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

7. Attendance Requirements:

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

8. Minimum Academic Requirements:

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

- 8.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project, if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In case of mandatory courses, internships, project work viva – voce, he/she should secure 40% of the total marks.
- 8.2 A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

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

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

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

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

- 8.4 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained.
- 8.5 Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

9. Course Pattern:

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

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

- (ii) **With-holding of Results:**

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

(iii) Grading

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

Table – Conversion into Grades and Grade Points assigned

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

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

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

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

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

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

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.,

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

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	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 4.0 < 5.5$

12. Gap Year:

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

13. Transitory Regulations:

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

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

14. Minimum Instruction Days:

The minimum instruction days including exams for each semester shall be 90 days.

15. Medium of Instruction

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

16. Rules of Discipline

- (i) Use of mobile phones with camera, in the campus is strictly prohibited.
- (ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.

- (iii) Students shall not bring outsiders to the institution or hostels.
- (iv) Students shall not steal, deface, damage or cause any loss to the institution property.
- (v) Students shall not collect money either by request or coercion from others within the campus or hostels.
- (vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.
- (vii) Use of vehicles by the students inside the campus is prohibited.
- (viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.
- (ix) Any material to be uploaded to social media sites need to be approved by Head of the Department concerned/Dean/Principal.
- (x) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period
- (xi) Dress Code
Boys : All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.
Girls : All the girls students shall wear saree/chudidhar with dupatta

17. Punishments for Malpractice cases – Guidelines

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

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

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

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

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

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

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

1. Award of B.Tech. Degree

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

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

2. Minimum Academic Requirements:

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

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar & Comprehensive viva-voce he should secure 40% in the internal evaluation.
- ii. A student shall be promoted from third year to fourth year only if he/she fulfils the academic requirements of 40% credits obtained till III-I from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.
 - One regular and Two supplementary examinations of III semester.
 - One regular and one supplementary examinations of IV semester.
 - One regular examination of V semester.

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

3. Course Pattern

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

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

5. Award of Class:

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

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

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

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

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

FIRST YEAR B. TECH – COMPUTER SCIENCE AND ENGINEERING- INTERNET OF THINGS (CSO)

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	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	-	- http://www.gpcet.ac.in/	-
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	Human Values & Professional Ethics	MC	3	0	0	0	-	-	-
20SIP09	Communication Skills - focus on Listening, Speaking, Reading, Writing skills	BS	2	1	2	0	-	-	-
TOTAL			16	3	22	0			-

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

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

FIRST YEAR B. TECH – COMPUTER SCIENCE AND ENGINEERING- INTERNET OF THINGS (CSO)

I SEMESTER (I YEAR)									
S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A30002	Mathematics-I	BS	3	0	0	3	30	70	100
A30050	Chemistry	BS	3	0	0	3	30	70	100
A30501	Computer Programming	ES	3	0	0	3	30	70	100
A33501	Foundations for IOT	ES	3	0	0	3	30	70	100
A30302	Engineering Workshop	ES	1	0	4	3	30	70	100
A30502	Computer Programming Lab	ES	0	0	3	1.5	30	70	100
A30009	Chemistry Lab	BS	0	0	3	1.5	30	70	100
A33502	Foundations for IOT Lab	ES	0	0	3	1.5	30	70	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		Internal	External	Total
A30010	Mathematics-II	BS	3	0	0	3	30	70	100
A30004	Applied Physics	BS	3	0	0	3	30	70	100
A30503	Data Structures	ES	3	0	0	3	30	70	100
A30001	Communicative English	HS	3	0	0	3	30	70	100
A30301	Engineering Graphics & Computer Aided Drafting	ES	1	0	4	3	30	70	100
A30008	Applied Physics Lab	BS	0	0	3	1.5	30	70	100
A30504	Data Structures Lab	ES	0	0	3	1.5	30	70	100
A30006	Communicative English Lab	ES	0	0	3	1.5	30	70	100
A30031	Environmental Science	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

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

A30002 – MATHEMATICS – I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	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, Rolle's theorem, Lagrange's 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, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-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.

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

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)

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	30	70	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

Course Outcomes (COs)

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

- A30005.1 To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box.
- A30005.2 To differentiate between pH metry, Potentiometric and conductometric titrations.
- A30005.3 Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
- A30005.4 Understand the principles of different analytical instruments and explain their applications.
- A30005.5 Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
- A30005.6 Explain of different types of colloids, their preparations, properties and applications

2. 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.

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

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. Plastics: 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.

3. Books and Materials

Text Books:

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

Reference Books:

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

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

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	30	70	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 Associativity, 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.

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

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)

A33501 – FOUNDATIONS FOR 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	30	70	100

1. Course Description

Course Overview

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IOT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the middleware for Internet of Things. To understand the concepts of Web of Things.

Course Pre/Co-requisites

- Computer Programming
- Mathematics-1
- Physics

2. Course Outcomes (COs)

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

- A33501.1 An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
- A33501.2 An ability to design, implement and evaluate a system / computer-based system process, component or program to meet desired needs
- A33501.3 An ability to identify, formulate and solve engineering problems using the concepts of Artificial Intelligence.
- A33501.4 Design and conduct experiments as well as analyze and interpret data using Machine Learning Algorithms
- A33501.5 An ability to use current techniques and skills necessary for computing and engineering practice
- A33501.6 Get familiarized with the tools mandatory for handling problem solving techniques

3. Course Syllabus

Unit - I

Number systems-Representations-Conversions, error detection and error correction, Boolean constants and variables, basic gates: operation and truth tables, describing logic gates algebraically, evaluating logic circuit outputs, implementing circuits from Boolean expressions, universality of gates, Boolean theorems

Unit – II

Computer Integer Arithmetic: addition, subtraction, multiplication, division, floating point arithmetic: Addition, subtraction, multiplication, division. Instruction set architecture of a CPU registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. RISC and CISC architecture.

Unit III

Introduction to microcontrollers: overview of 8051 microcontroller, Architecture, I/O ports, Memory organization, addressing modes and instruction set of 8051, Simple programs

Unit-IV

Sensing devices- Accelerometers, temperature sensors, magnetometers, proximity sensors, pressure sensors,

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

gas RFID sensors, humidity sensors. Switch type Hall effect sensors, Sensor modules, nodes and systems, Actuators

Unit–V:

Basics of Networking. Wireless technologies for the IoT, Introduction to Arduino Programming – Simple examples.

Raspberry Pi: Introduction, Functioning of Raspberry Pi and Demo of implementation of IoTs with Raspberry Pi.

4. Books and Materials

Text Book(s)

1. Morris Mano, CA.
2. Kenneth.J.Ayala. The 8051 microcontroller, 3rd edition, Cengage learning,2010
3. Charles Bell, Beginning Sensor Networks with XBee, Arduino and Raspberry Pi, Apress

Reference Book(s)

1. CunoPfister – Getting Started with the Internet of Things: Connecting sensors and Microcontrollers to the cloud, Shroff Publishers,latest edition.
 2. Jan Holler, VlasiosTsiatsis, Catherine Muligan, et al., Internet of Things: Technologies and Applications for a New Age of Intelligence, Academic Press.
-

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

A30302 – ENGINEERING WORKSHOP

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	3	30	70	100

1. Course Description

Course Overview

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

Course Pre/co-requisites

This course has no Pre/co-requisites

2. Course Outcomes (COs)

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

- A30302.1 Apply wood working skills to make products.
- A30302.2 Perform metal cutting operations in the fitting section to make models.
- A30302.3 Perform simple welding operations to join to metal pieces.
- A30302.4 Apply sheet metal working skills to make required models.
- A30302.5 Evaluate the performance analysis of various pumps and turbines.
- A30302.6 Perform general maintenance works on own at house/ work place.

3. Course Syllabus

1. **Fitting Trade**—Making of a L-fit from the given M.S flat material piece.
 2. **Fitting Trade**—Making of a Square joint from the given M.S flat material piece.
 3. **Carpentry Trade**—Making of a cross lap joint as per specification.
 4. **Carpentry Trade**—To make a dovetail joint as per specification.
 5. **Tin Smithy**—Making of an open scoop with the given sheet metal
 6. **Tin Smithy**—Making of a square tin with the given sheet metal
 7. **Foundry**: Preparation of a sand mould using a single piece pattern
 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
-

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

- 11. **House Wiring:** One bulb connected by two Two- way switches
- 12. **House Wiring:** Staircase-wiring
- 13. **House Wiring:** Tubelight wiring
- 15. **House Wiring:** Go-Down Wiring

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, 7th edition, 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)

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	30	70	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

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

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>

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

A30009 – CHEMISTRY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	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 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's law

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 nonmaterial's by Precipitation method.
-

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

4. Laboratory Requirements

1. Conductivity meter
2. pH 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)

A33502 -FOUNDATIONS FOR IOT 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	30	70	100

1. Course Description

Course Overview

The aim of the Laboratory is to provide insight of Iot and its services. Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices. It also covers the concepts of data communication, fundamental Database Techniques, customs and terms including the basic components of hardware and software. This course helps the students in gaining the knowledge about the sensor devices, Network communication and engineering problems.

Course Pre/Co-requisites

A33501-Foundations for IOT

2. Course Outcomes (COs)

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

- A33502.1 Analyze the basic laws and usage of components in electric circuits.
- A33502.2 Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation.
- A33502.3 Analyze building blocks of Internet of Things and characteristics.
- A33502.4 Understand the theory, operation and applications of semiconductor devices.
- A33502.5 Determine various parameters of rectifier circuits using with and without filters.
- A33502.6 Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT, FET to meet the given specifications.

3. Course Syllabus

PART – A

BASIC ELECTRICAL ENGINEERING LABORATORY (Five Experiments from the given list)

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.
-

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

PART – B

8. Study and Install IDE of Arduino and different types of Arduino.
9. Write program using Arduino IDE for Blink LED.
10. Write Program for RGB LED using Arduino.
11. Study the Temperature sensor and Write Program for monitor temperature using Arduino.
12. Study and Implement RFID, NFC using Arduino.

PART – C

BASIC ELECTRONICS LABORATORY

(Five Experiments from the given list)

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. Laboratory Equipment/Software/Tools Required

5. Books and Materials

Text Book(s)

1. Morris Mano, CA.
2. Kenneth.J.Ayala. The 8051 microcontroller, 3rd edition, Cengage learning, 2010
3. Charles Bell, Beginning Sensor Networks with XBee, Arduino and Raspberry Pi, Apress

Reference Book(s)

1. CunoPfister – Getting Started with the Internet of Things: Connecting sensors and Microcontrollers to the cloud, Shroff Publishers, latest edition.
 2. Jan Holler, VlasiosTsiatsis, Catherine Muligan, et al., Internet of Things: Technologies and Applications for a New Age of Intelligence, Academic Press.
-

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

A30010 – MATHEMATICS – II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	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.

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

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)

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	30	70	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 Magnetism--Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites and garnets and its applications.

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

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)

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	30	70	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/Co-requisites

- 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.
- A30504.4 Demonstrate advantages and disadvantages of specific algorithms and data Structures.
- A30505.5 Develop programs for efficient data organisation with reduce time complexity.
- A30506.6 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

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

Unit-5

Search: Sequential Search, Binary Search, Hashing, time complexity.

Trees and Graphs:

Trees: examples, Binary Trees, Tree Traversals, Binary Search Trees.

Graph: BFS and DFS.

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. B.W. Kernighan and Dennis M.Ritchie, The C Programming Language, (PHI), 2nd Edition 2003.
 2. Jean Paul Tremblay and Paul G.Sorenson[2007], An Introduction to Data Structures With Applications, TMH
-

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

A30001 – COMMUNICATIVE ENGLISH

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview:

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

Course Pre/Co-requisites:

The course has no specific pre/co-requisites

Course Out comes (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

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

UNIT –II

Listening: Listening for purpose.

Speaking: Short structured talks on specific topics.

Reading: Identifying and 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 Comparisons.

Text: Chinduyellamma

Innovation: Muhammad Yunus

UNIT – V

Listening: Listening comprehension.

Speaking: Formal Oral Presentations.

Reading: Reading for comprehension

Writing: Summary writing. Technical Report writing.

Grammar and Vocabulary: Spotting the errors. Idioms and Phrases.

Text: Politics and the English Language: George Orwell

The Dancer with a White Parasol: Ranjana Dave

4. Books and Materials

Text Book:

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

Reference Books:

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.

2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.

3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.

Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

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

A30301-ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	4	14	0	56	3	30	70	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

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

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

UNIT III

Projections of Lines: Projections 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 views to Orthographic Views.

PART –B (PRACTICE ONLY)

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 Edition 2016.
2. K. Venugopal, *Engineering Drawing and Graphics*, New age International Publishers, 5th edition, 2004.

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

A30008 – APPLIED PHYSICS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	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
- A30008.5 Evaluate the acceptance angle of an optical fiber and numerical aperture
- A30008.6 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
-

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

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)

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	30	70	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/Co-requisites

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

Write a program to sort the number of elements using sorting by exchange.

Task – 1

Write a program to sort the characters in a string using sorting by exchange.

Write a program to sort numbers using insertion sort.

Task – 2

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

Write a program to implement stack, queue, circular queue using arrays and linked lists on employee details.

Task – 4

Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list

Task– 5

Write a program to perform the operations creation, insertion, deletion, and

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

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-GrawHill Education, 2008.
2. Debasis Samanta. *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 Vijayalakshmi Pai. *Data Structures and Algorithms*. TMH, 2008.
-

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

A30006 – COMMUNICATIVE ENGLISH LABORATORY

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

Course Objectives:

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

Course Pre/co requisites

A30001-Communicative English

2. Course Outcomes (COs)

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

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

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

3. Course Syllabus

List of topics to be covered:

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

4. Books and Materials

Text Books:

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

Reference Books:

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

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

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*	0	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 -1: 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 – 2: 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

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

aesthetic value) Hot spots and Threats to biodiversity. In-situ and Ex-situ conservation of biodiversity.

Unit -3: 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 -4: 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 -5: 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. Erach Bharucha, *Textbook of Environmental Studies for Undergraduate Courses*. 1st edition, Universities press, 2005.
 2. Benny Joseph, *Environmental studies*, 3rd edition, McGraw Hill Education (India) Private Limited, 2018.
-

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS
B. TECH – COMPUTER SCIENCE AND ENGINEERING – INTERNET OF THINGS(CSO)

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A30019	Managerial Economics & Financial Analysis	HS	3	0	0	3	40	60	100
A30508	Database Management Systems	PC	3	0	0	3	40	60	100
A30016	Discrete Mathematics	PC	3	0	0	3	40	60	100
A33503	Computer Networks	PC	3	0	0	3	40	60	100
A30512	Design and Analysis of Algorithms	PC	3	0	0	3	40	60	100
A30509	Database Management Systems Laboratory	PC	0	0	3	1.5	40	60	100
A33504	Computer Networks Laboratory	PC	0	0	3	1.5	40	60	100
A30516	Design and Analysis of Algorithms Laboratory	PC	0	0	3	1.5	40	60	100
A30511	Android Application Development	SC	1	0	2	2	40	60	100
A30035	Universal Human Values	MC	2	0	0	0	100*	0	100*
TOTAL			18	0	11	21.5	360	540	900

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

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A30011	Probability & Statistics	BS	3	0	0	3	40	60	100
A33505	Sensors and Devices	PC	3	0	0	3	40	60	100
A30514	Operating Systems	PC	3	0	0	3	40	60	100
A30423	Analog Electronic Circuits	ES	3	0	0	3	40	60	100
A30515	Software Engineering	PC	3	0	0	3	40	60	100
A35506	Sensors and Devices Laboratory	PC	0	0	3	1.5	40	60	100
A30424	Analog Electronic Circuits Laboratory	ES	0	0	3	1.5	40	60	100
A30518	Operating Systems Laboratory	PC	0	0	3	1.5	40	60	100
A33108	Unix & Shell Programming	SC	1	0	2	2	40	60	100
TOTAL			16	00	11	21.5	360	540	900
Internship 2 Months (Mandatory) during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

COURSE STRUCTURE**A30019 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

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

1. Course Description**Course Overview**

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

- A30019.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
- A30019.2 Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
- A30019.3 Classify the market structure to decide the fixation of suitable price
- A30019.4 Apply capital budgeting techniques to select best investment opportunity
- A30019.5 Analyze and prepare financial statements to assess financial health of business.

3. Course Syllabus**UNIT I**

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE
A30508– DATABASE MANAGEMENT SYSTEMS

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

1. Course Description**Course Overview**

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

Course Pre/corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

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

- A30508.1 Apply suitable data model for given application
- A30508.2 Construct optimized SQL queries to solve real time problems
- A30508.3 Apply suitable normal form to eliminate data redundancy
- A30508.4 Use suitable transaction model to avoid Deadlock
- A30508.5 Choose appropriate index structure to improve performance

3. Course Syllabus**UNIT I**

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE
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 theorems 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
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.

Course Pre/corequisites

A30516- Discrete Mathematics

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-the IPV4 protocol, IP- addresses, internet control protocols, IPV6.

UNIT-IV

Transport Layer: Transport services, elements of transport protocols, 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. Behrouz A. Forouzan, *Data Communications and Networking*, TMH, 4th edition 2017.
2. S.Keshav, *An Engineering Approach to Computer Networks*, Pearson Education, 2nd edition 2014.

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

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

- d. Rename the column of Employ table using alter command.
- e. Delete the employee whose empno is 19

TASK-2

Create **department** table with the following structure.

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 is 9.
- 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 **reservestable**

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

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

1. Write a PL/SQL block that will display the name, dept no, salary of first 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 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 salary are 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.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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 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-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, number about each customer are kept in the database. For the above case 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	
<p>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:</p> <ol style="list-style-type: none">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**A33504 – COMPUTER NETWORKS LABORATORY**

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 laboratory course provides students with hands on training regarding the design, troubleshooting, modeling and evaluation of computer networks such as network addressing, address resolution protocol, basic troubleshooting tools, IP routing ,route discovery ,TCP and UDP, IP fragmentation and many others. Students will also be introduced to the network modeling and simulation, and they will have the opportunity to build some simple networking models using the tool and perform simulations that will help them evaluate their design approaches and expected network performance.

Course Pre/corequisites

A33503 -Computer Networks

2. Course Outcomes (COs)

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

- A33504.1 Apply the network principles in establishing network communications
- A33504.2 Make use of layered network architecture functionalities in connecting systems
- A33504.3 Apply mathematical concepts in solving the computational problems
- A33504.4 Analyze performance of protocols in information exchange
- A33504.5 Compare routing algorithms for dynamic routing

3. Course Syllabus**Lab Experiments:**

- 1 Study of different types of network cables and practically implement the cross-wired cable and straight through cable using crimping tool.
- 2 Study of network devices in detail.
- 3 Study of network IP.
- 4 Connect the computers in local area network.
- 5 Study of basic network command and network configuration commands.
- 6 Configure a network topology using packet tracer software.
- 7 Configure a network topology using packet tracer software.
- 8 Configure a network using distance vector routing protocol.
- 9 Configure network using link state vector routing protocol.

4. Laboratory Equipment/Software/Tools Required

1. A diagramming tool: A diagramming tool lets you draw pictures of your network. Visio (from Microsoft).
2. A network discovery program: For larger networks, you may want to invest in a network discovery program such as Spice works.
3. 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. Andrew Tanenbaum, *Computer Networks*, 6th edition, Pearson Education, PHI, 2016.

Reference Book(s)

1. S.Keshav, *An Engineering Approach to Computer Networks*, 2nd edition, Pearson Education, 2001.
2. William, A. Shay, *Understanding communications and Networks*, 3rd edition, Thomson Publication, 2006.

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 8x8 chessboard is still unknown.
- 10.a. Design and implement in Java to find a subset of a given set $S = \{S_1, S_2, \dots, S_n\}$ 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

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

5. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE**A30511– ANDROID APPLICATION DEVELOPMENT**

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

1. Course Description**Course Overview**

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

Course Pre/corequisites

This course has no pre/co-requisites.

2. Course Outcomes (COs)

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

- A30511.1 Understand the different types of mobile devices.
- A30511.2 Learn how to apply Android Operating System on mobile.
- A30511.3 They can understand the systems mobile application distribution.
- A30511.4 Implementation of mobile design principles.
- A30511.5 Implementation of prompt prototyping techniques to design and develop mobile interfaces

3. Course Syllabus

List of Experiments:

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

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

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

A30035-UNIVERSAL HUMAN VALUES

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

- A30035.1 Understand the significance of value inputs in a classroom and start applying them in their life and profession
- A30035.2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- A30035.3 Understand the value of harmonious relationship based on trust and respect in their life and profession
- A30035.4 Understand the role of a human being in ensuring harmony in society and nature.
- A30035.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
- A30035.6 Analyze the value of maintaining ethical values in critical situations

Course Syllabus**UNIT – I****Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

- Understanding the need, basic guidelines, content and process for Value Education
- Self Exploration—what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- 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 (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*) - from family to world family!

UNIT –IV

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

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

UNIT – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

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

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

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

- a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
- b) At the level of society: as mutually enriching institutions and organizations

4. Books and Materials

Text Book:

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

Reference Books:

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

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A30011	Probability & Statistics	BS	3	0	0	3	40	60	100
A33505	Sensors and Devices	PC	3	0	0	3	40	60	100
A30514	Operating Systems	PC	3	0	0	3	40	60	100
A30423	Analog Electronic Circuits	ES	3	0	0	3	40	60	100
A30515	Software Engineering	PC	3	0	0	3	40	60	100
A35506	Sensors and Devices Laboratory	PC	0	0	3	1.5	40	60	100
A30424	Analog Electronic Circuits Laboratory	ES	0	0	3	1.5	40	60	100
A30518	Operating Systems Laboratory	PC	0	0	3	1.5	40	60	100
A33108	Unix & Shell Programming	SC	1	0	2	2	40	60	100
TOTAL			16	00	11	21.5	360	540	900
Internship 2 Months (Mandatory) during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

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), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

4. Books and Materials

Textbooks:

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

Reference Books:

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

COURSE STRUCTURE
A33505– SENSORS AND DEVICES

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 terminology, technology and its applications and introduces the concept of M2M (machine to machine) with necessary protocols. It introduces the Python Scripting Language which is used in many IoT devices and also introduces the Raspberry PI platform that is widely used in IoT applications. It also introduce the implementation of web-based services on IoT devices.

Course Pre/corequisites

There are no prerequisites and corequisites for this course.

2. Course Outcomes (COs)

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

- A33505.1 Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.
- A33505.2 Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules.
- A33505.3 Market forecast for IoT devices with a focus on sensors.
- A33505.4 Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi.

3. Course Syllabus**UNIT - I**

Introduction to Internet of Things- Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.

UNIT - II

IoT and M2M- Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT - III

IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

UNIT - IV

Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors.

Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor.

UNIT - V

IoT Physical Servers and Cloud Offerings– Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API.

4. Books and Materials

Text Book(s)

1. Arshdeep Bahga and Vijay Madisetti, *Internet of Things - A Hands-on Approach*, Universities Press, 2015, ISBN: 9788173719547.
2. Matt Richardson & Shawn Wallace, O'Reilly (SPD), *Getting Started with Raspberry Pi*, 2014, ISBN: 9789350239759.
3. Simon Monk, O'Reilly (SPD), *Raspberry Pi Cookbook, Software and Hardware Problems and solutions*, 2016, ISBN 7989352133895.

Reference Book(s)

1. Peter Waher, *Learning Internet of Things*, Packt Publishing, 2015 Editors Ovidiu Vermesan.
2. Peter Friess, *Internet of Things – From Research and Innovation to Market Deployment*, River Publishers, 2014.
3. N. Ida, *Sensors, Actuators and Their Interfaces*, SciTech Publishers, 2014.

COURSE STRUCTURE
A30514– OPERATING SYSTEMS

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

1. Course Description**Course Overview**

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

Course Pre/corequisites

A30501- Computer Programming

2. Course Outcomes (COs)

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

- A30514.1 Apply the basic principles of Operating Systems in system programming
- A30514.2 Apply the process synchronization concepts in multiprogramming environment
- A30514.3 Solve the memory management problems with paging and segmentation techniques
- A30514.4 Design algorithmic strategies to handle deadlock problems
- A30514.5 Implement the concepts of secured file system for confidentiality and authentication.

3. Course Syllabus**UNIT-I**

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

UNIT-II

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

UNIT-III

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation. Swapping, contiguous memory allocation, segmentation, paging, structure of the page table. Virtual memory: demand

paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

UNIT-IV

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

UNIT-V

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE
A30423 – ANALOG ELECTRONIC CIRCUITS

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 components such as diodes, BJTs, FETs and its applications of all components. This course gives understanding of various types of amplifier circuits. The course objective is to learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems. This course understands the concepts of combinational logic circuits and sequential circuits.

Course Pre/corequisites

There are no prerequisites and corequisites for this course.

2. Course Outcomes (COs)

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

- A30423.1 Know the characteristics of various components.
- A30423.2 Understand the utilization of components.
- A30423.3 Design and analyze small signal amplifier circuits.
- A30423.4 Learn Postulates of Boolean algebra and to minimize combinational functions
- A30423.5 Design and analyze combinational and sequential circuits.
- A30423.6 Design and analyze combinational and sequential circuits.

3. Course Syllabus**UNIT - I**

Diodes and Applications: Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, effect of temperature, Tunnel diodes, photo diode, LED.

Diode Applications - clipping circuits, comparators, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT - II

BJTs: The junction transistor, transistor as an amplifier, CB, CE, CC configurations, comparison of transistor configurations, the operating point, self-bias or Emitter bias, thermal runaway. Transistor at low frequencies, CE amplifier response, Emitter follower, RC coupled amplifier,

FETs: J-FET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers.

UNIT - III

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT - IV

Combinational Logic Circuits: Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT - V

Sequential Logic Circuits: Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

4. Books and Materials

Text Book(s)

1. T.Tirupal, B.Chandra Mohan, S.Srinivas Kumar, P.Bindu Swetha, *Electronic Devices and Circuits*, Mantech Publications, 1st Edition, 2021.
2. Jacob Millman, Christos Halkias and Chethan D. Parikh, *Integrated Electronics: Analog and Digital Circuits and Systems*, 2/e, Tata McGraw-Hill Education, India, 2010.

Reference Book(s)

1. Morris Mano and Michael D. Cilette, *Digital Design*, 5/e, Pearson, 2011.
2. Roger L. Tokheim, *Digital Principles*, 3/e, Schaum's outline series, 1994.

COURSE STRUCTURE
A30515 – SOFTWARE ENGINEERING

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

1. Course Description**Course Overview**

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

Course Pre/corequisites

A30501-Python Programming

2. Course Outcomes (COs)

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

- A30515.1 Understand the various phases of software development life cycles and software Requirements.
- A30515.2 Possess necessary skills to elicit the requirements of a software system and to create well written software documentation involving appropriate system models.
- A30515.3 Design, implement and evaluate a computer based system, process, component or program to meet desired needs within realistic constraints specific to the field
- A30515.4 Construct software projects by integrating components with appropriate user interface
- A30515.5 Apply various testing strategies to verify, validate and to release error free software

3. Course Syllabus**UNIT I**

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

UNIT II

Requirements Engineering: Understanding Requirements: Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the requirements model, Negotiating Requirements, Validating Requirements. Requirements Modeling (Scenarios, Information and Analysis Classes): Requirements Analysis, Scenario-Based

Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling. Requirements Modeling (Flow, Behavior, Patterns and WEBAPPS): Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Requirements Patterns Modeling

UNIT III

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

UNIT IV

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

UNIT V

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE
A35506 – SENSORS AND DEVICES 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 terminology, technology and its applications and introduces the concept of M2M (machine to machine) with necessary protocols. It introduces the Python Scripting Language which is used in many IoT devices and also introduces the Raspberry PI platform that is widely used in IoT applications. It also introduce the implementation of web-based services on IoT devices.

Course Pre/corequisites

A33505 – Sensors and Devices

2. Course Outcomes (COs)

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

- A35506.1 Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.
- A35506.2 Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules.
- A35506.3 Market forecast for IoT devices with a focus on sensors.
- A35506.4 Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi.

3. Course Syllabus

1. Connect an LED to GPIO pin 25 and control it through command line.
2. Connect an LED to GPIO pin 24 and a Switch to GPIO 25 and control the LED with the switch.
3. The state of LED should toggle with every press of the switch Use DHT11 temperature sensor and print the temperature and humidity of the room with an interval of 15 seconds
4. Use joystick and display the direction on the screen
5. Use Light Dependent Resistor (LDR) and control an LED that should switch-on/off depending on the light.
6. Create a traffic light signal with three colored lights (Red, Orange and Green) with a duty cycle of 5-2-10 seconds.
7. Switch on and switch of a DC motor based on the position of a switch.
8. Convert an analog voltage to digital value and show it on the screen.
9. Create a door lock application using a reed switch and magnet and give a beep when the door is opened.
10. Control a 230V device (Bulb) with Raspberry Pi using a relay.
11. Control a 230V device using a threshold temperature, using temperature sensor.

12. Create an application that has three LEDs (Red, Green and white). The LEDs should follow the cycle (All Off, Red On, Green On, White On) for each clap (use sound sensor).
13. Create a web application for the above applications wherever possible with suitable modifications to get input and to send output.

4. Books and Materials

Text Book(s)

1. Arshdeep Bahga and Vijay Madisetti, *Internet of Things - A Hands-on Approach*, Universities Press, 2015, ISBN: 9788173719547.
2. Matt Richardson & Shawn Wallace, O'Reilly (SPD), *Getting Started with Raspberry Pi*, 2014, ISBN: 9789350239759.
3. Simon Monk, O'Reilly (SPD), *Raspberry Pi Cookbook, Software and Hardware Problems and solutions*, 2016, ISBN 7989352133895.

Reference Book(s)

1. Peter Waher, *Learning Internet of Things*, Packt Publishing, 2015 Editors Ovidiu Vermesan.
2. Peter Friess, *Internet of Things – From Research and Innovation to Market Deployment*, River Publishers, 2014.
3. N. Ida, *Sensors, Actuators and Their Interfaces*, SciTech Publishers, 2014.

COURSE STRUCTURE
A30424 – ANALOG ELECTRONIC CIRCUITS LABORATORY

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 components such as diodes, BJTs, FETs and applications of components. This course gives understanding of various types of amplifier circuits and learns basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems. This course also introduces the concepts of combinational logic circuits and sequential circuits.

Course Pre/corequisites

A30423 – Analog and Digital Electronics

2. Course Outcomes (COs)

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

- A30424.1 Know the characteristics of various components.
- A30424.2 Know the characteristics of various components.
- A30424.3 Design and analyze small signal amplifier circuits.
- A30424.4 Postulates of Boolean algebra and to minimize combinational functions.
- A30424.5 Design and analyze combinational and sequential circuits.
- A30424.6 Known about the logic families and realization of logic gates.

3. Course Syllabus

1. Full Wave Rectifier with & without filters
2. Input and Output characteristics of FET in CS configuration
3. Common Emitter Amplifier Characteristics
4. Common Base Amplifier Characteristics
5. Common Source amplifier Characteristics
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal gates
9. Generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder / Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL, etc

4. Books and Materials

Text Book(s)

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

1. T.Tirupal, B.Chandra Mohan, S.Srinivas Kumar, P.Bindu Swetha, *Electronic Devices and Circuits*, Mantech Publications, 1st Edition, 2021.
2. Jacob Millman, Christos Halkias and Chethan D. Parikh, *Integrated Electronics: Analog and Digital Circuits and Systems*, 2/e, Tata McGraw-Hill Education, India, 2010.

Reference Book(s)

1. Morris Mano and Michael D. Cilette, *Digital Design*, 5/e, Pearson, 2011.
2. Roger L. Tokheim, *Digital Principles*, 3/e, Schaum's outline series, 1994.

COURSE STRUCTURE
A30518– OPERATING SYSTEMS LABORATORY

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

1. Course Description**Course Overview**

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

Course Pre/corequisites

A30515: Operating Systems

2. Course Outcomes (COs)

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

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

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

A30518.3 Implement algorithms handling deadlock problems

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

A30518.5 Apply threading concepts to handle concurrency.

3. Course Syllabus

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

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

4 Laboratory Equipment/Software/Tools Required:

1. Computers installed with operating system
2. C Compiler

5 Books and Materials

Text Book(s)

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

Reference Books:

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

COURSE STRUCTURE
A33108– UNIX & SHELL PROGRAMMING

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

1. Course Description**Course Overview**

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

Course Pre/Co-requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

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

- A33108.1 Understand the basic unix/linux commands
- A33108.2 Learn importance of shell scripting
- A33108.3 Apply shell programming to various files
- A33108.4 Improve individual / teamwork skills, communication & report writing skills with ethical values

3. Course Syllabus

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

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

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

Example Programs:

1. Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc, sort, cut, grep, dd, df, space, du, ulimit
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script exercises based on following:
 - (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then- else-fi,

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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

4. Write a shell script to create a file. Follow the instructions

- (i) Input a page profile to yourself, copy it into other existing file
- (ii) Start printing file at certain line
- (iii) Print all the difference between two file, copy the two files.
- (iv) Print lines matching certain word pattern.

5. Write shell script for-

- (i) Showing the count of users logged in,
- (ii) Printing Column list of files in your home directory
- (iii) Listing your job with below normal priority
- (iv) Continue running your job after logging out

6. Write a shell script to change data format. Show the time taken in execution of this script.

7. Write a shell script to print files names in a directory showing date of creation & serial number of the file.

8. Write a shell script to count lines, words, and characters in its input (do not use wc).

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B.TECH – COMPUTER SCIENCE AND ENGINEERING - INTERNET OF THINGS (CSO)

V SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A33509	IoT System Development	PC	3	1	0	3	40	60	100
A33510	Java Programming	PC	3	1	0	3	40	60	100
A33511	Wireless Sensor Networks	PC	3	1	0	3	40	60	100
	Professional Elective-I	PE	3	1	0	3	40	60	100
	Open Elective-I	OE	3	1	0	3	40	60	100
A33512	IOT System Development Lab	PC	0	0	3	1.5	40	60	100
A33513	Java Programming Lab	PC	0	0	3	1.5	40	60	100
A33114	Web Application Development	SC	2	0	2	2	40	60	100
A30034	Gender Sensitization	MC	3	0	0	0	100	00	100*
A33514	Summer Internship 2 Months (Mandatory)		0	0	0	1.5	100	00	100
TOTAL			20	05	08	21.5	520	480	900

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

VI SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A33515	IoT Application development on Cloud Platforms.	PC	3	0	0	3	40	60	100
A33516	Mobile Application Development for IoT	PC	3	0	0	3	40	60	100
A33517	Data Visualization Techniques	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
A33518	IoT Application development on Cloud Platforms Lab	PC	0	0	3	1.5	40	60	100
A33522	Mobile Application development for IoT Lab	PC	0	0	3	1.5	40	60	100
A33520	Data Visualization Techniques Lab	PC	0	0	3	1.5	40	60	100
A30021	Professional English Communication Skills	SA	2	0	2	2	40	60	100
A30036	Indian Constitution and Multiculturalism	MC	2	0	0	0	100	00	100*
TOTAL			19	00	11	21.5	460	540	900

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – COMPUTER SCIENCE AND ENGINEERING - INTERNET OF THINGS (CSO)

Professional Electives

Professional Elective – 1	
Course Code	
A33526	Machine Learning Essentials
A33527	Distributed Computing
A33528	Software Testing Methodologies
A33529	Theory of Computation and Compiler Design
Professional Elective – 2	
Course Code	Title of the Course
A33530	Cloud Computing
A33531	Deep Learning with IoT
A33532	Wearable Computing
A33533	Introduction to Industrial IoT

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A33509 - IoT SYSTEM DEVELOPMENT

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

1.Course Description:

Course Overview:

This course covers the development of internet of things (IoT) products and services including devices for sensing, actuation, processing and communication. In this course students study – micropython for esp32, python GUI for raspberry pi and how to connect I/O devices, sensors with iot servers using esp32 and raspberry pi. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course has simple examples with integration of techniques turned into an application.

Course Pre-requisite

A33505–Sensor and Devices

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33509.1 Apply Design Methodology concepts for developing IoT applications.

A33509.2 Interface I/O devices, Sensors with ESP32 using MicroPython.

A33509.3 Connect the I/O devices, Sensors with IoT Servers using ESP32 and Raspberry Pi.

A33509.4 Apply Python GUI concepts for programming of Raspberry Pi

A33509.5 Develop IoT applications using ESP32 and Raspberry Pi.

3.Course Syllabus

UNIT - I DESIGN METHODOLOGY

Design Methodology, Challenges in IoT Design, IoT System Management, Overview of IoT Servers-kaa, temboo, thethings-io, adafruit-io, thingsboard, thingspeak, arduino-iot, and ubidots.

UNIT - II MICROPYTHON WITH ESP32

Introduction to ESP32 and MicroPython, Flashing MicroPython Firmware using Mu-Editor, Steps to run a code, Program commands – Delay and Timing, Pins and GPIO, UART, PWM, ADC. LED Interface, Switch Interface, Serial Interface, Potentiometer Interface, DHT Sensor Interface.

UNIT - III IOT SYSTEMS WITH ESP32

Wi-Fi network commands, Connecting ESP32 to Wi-Fi network, DHT11 Data Logger with thingspeak server, Controlling LED with adafruit-io server.

UNIT - IV PYTHON GUI WITH RASPBERRY PI

Introduction to tkinter and streamlit, basic tkinter and streamlit widgets, controlling led, reading a – switch, digital and analog sensor, controlling brightness of led.

UNIT - V IOT SYSTEMS WITH RASPBERRY PI

Ultrasonic Sensor Data Logger with thingspeak server, Controlling LED with adafruit-io server, controlling GPIO Outputs using a web interface.

4.Textbooks and Materials:

Textbooks

- 1) Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain. Internet of Things with Raspberry Pi and Arduino, 1st edition, CRC Press, 2019
- 2) AgusKurniawan, MicroPython for ESP32 Development, 1st edition, PE Press Publishing, 2017

Reference Books:

- 1) Simon Monk, O'Reilly (SPD), Raspberry Pi Cookbook, Software and Hardware Problems and solutions, 2016, ISBN 7989352133895.

Online Learning Resources:

- 1) <https://randomnerdtutorials.com/micropython-program-esp32-esp8266-mu-editor/>
- 2) <https://docs.streamlit.io/library/get-started>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A33510 - JAVA PROGRAMMING

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

1.Course Description

Course Overview

- To impart the core language features of Java and its Application Programming Interfaces (API).
- To demonstrate the use of threads, exceptions, files and collection frameworks in Java.
- To familiarize students with GUI based application development and database connectivity.

Course Pre-requisite

NIL

2. Course Outcome:

After completion of the course, students will be able to

- A33510.1 Comprehend Java Virtual Machine architecture and Java Programming Fundamentals.
- A33510.2 Design applications involving Object Oriented Programming concepts such as inheritance, association, aggregation, composition, polymorphism, abstract classes and interfaces.
- A33510.3 Design and build multi-threaded Java Applications.
- A33510.4 Build software using concepts such as files, collection frameworks and containers.
- A33510.5 Design and implement Java Applications for real world problems involving Database Connectivity.

3.Course Syllabus:

Unit:I Java Fundamentals

Java Basics: Java Design goal - Features of Java Language - JVM - Bytecode - Java source file structure basic programming constructs Arrays one dimensional and multi-dimensional enhanced for loop String package.

Unit :II Object Oriented Programming

Class Fundamentals - Object Object reference array of objects constructors methods over- loading this reference static block - nested class inner class garbage collection finalize() Wrapper classes Inheritance types - use of super - Polymorphism abstract class interfaces packages and sub packages.

Unit:III Robustness and Concurrency

Exception Handling - Exceptions Errors - Types of Exception - Control Flow in Exceptions- Use of try, catch, finally, throw, throws in Exception Handling - user defined exceptions -Multithreading Thread creation sharing the workload among threads synchronization inter thread communication deadlock.

Unit:IV Files, Streams and Object serialization

Data structures: Java I/O streams Working with files Serialization and deserialization of objects Lambda expressions, Collection framework List, Map, Set Generics Annotations.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Unit:V GUI Programming and Database Connectivity

GUI programming using JavaFX, exploring events, controls and JavaFX menus Accessing databases using JDBC connectivity.

4.Text Book And Materials:

Textbooks

1. Herbert Schildt, The Complete Reference -Java, Tata McGraw-Hill Education, Tenth Edition, 2017.
2. Paul J. Deitel, Harvey Deitel ,Java SE8 for Programmers (Deitel Developer Series) 3rd Edition, 2014
3. Y. Daniel Liang, Introduction to Java programming-comprehensive version-Tenth Edition, Pearson ltd 2015

Reference Books

1. Paul Deitel Harvey Deitel ,Java, How to Program, Prentice Hall; 9th edition , 2011.
2. Cay Horstmann BIG JAVA, 4th edition, John Wiley Sons,2009
3. Nicholas S. Williams, Professional Java for Web Applications, Wrox Press, 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33511 - Wireless Sensor Networks

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

1.Course Description:

Course Overview

- Understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems.
- Understand the medium access control protocols
- Learn transport layer protocols for wireless sensor networks, and design requirements.
- Understand the sensor network middleware, operating systems.

Codes Pre-requisite

Fundamentals of Computer Networks, Internet of Things

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33511.1 Explain the basic principles of Wireless Sensor Networks

A33511.2 Critically analyze transport protocols of WSNs

A33511.3 Explore the routing strategies of WSNs

A33511.4 Use operating systems related to WSN

3.Course Syllabus:

Unit-I:

Brief Historical Survey of Sensor Networks, Characteristic of WSN – WSN vs Adhoc Networks - Sensor node architecture, -operating systems-Application of Sensor Networks, advantages of sensor networks, Design challenges in WSNs.

Unit-II:

Wireless Sensor Network Routing Protocols -Types of networks-Homogeneous and Heterogeneous, Impact of Heterogeneity on Wireless Sensor Network, Routing Challenges, classification of routing protocols, Flat based Routing- Gradient based routing, Cougar, Constrained anisotropic diffusion routing, Rumor routing.

Unit-III:

Data centric Routing – SPIN – Directed Diffusion ,Hierarchical Routing - TEEN , APTEEN ,LEACH, PEGASIS – Location Based Routing – SPEED,GEAR, SPAN, Data aggregation - data aggregation operations - Aggregate Queries in Sensor Networks - Aggregation Techniques – TAG, Tiny DB.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Unit IV:

Congestion and flow control: Source of congestion- congestion control scenarios- Protocols for congestion and flow control in sensor networks: ESRT-CODA-PSFQ-RCRT-RMST-Fusion.

Unit-V:

QoS and Energy Management : Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes. Applications of WSN and Open Research Issues

4.Textbooks and Materials

Text Books

1. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, 2005.
2. Zhao and L. Guibas, "Wireless Sensor Networks", Morgan Kaufmann, San Francisco, 2004
3. KazemSohraby, Daniel Minoli and TaiebZnati, " Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley & Sons, 2007.
4. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Ltd, 2005.

Reference Books:

1. Feng Zhao and LeonidesGuibas, "Wireless sensor networks ", Elsevier publication - 2004.
2. Jochen Schiller, "Mobile Communications", Pearson Education, 2nd Edition, 2003.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33512 - IoT SYSTEM DEVELOPMENT 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 with the knowledge of esp32 micropython programming – blink led, push button, potentiometer, serial interface, lcd, dht sensor using Mu Editor. It also provides the knowledge of developing an iot applications using an esp32 and raspberry pi. This laboratory course helps to the students to use these experiments in IoT based projects.

Course Pre/Co-requisites

A33505– Sensor and Devices

A33509 – IoT System Development

2.Course Outcome (CO):

After completion of the course, students will be able to

A33512 .1 Develop MicroPython Programs using ESP32 and Mu Editor.

A33512 .2 Execute MicroPython programs for blink led, push button, potentiometer, serial interface, lcd, dht sensor.

A33512 .3 Build Programs of Raspberry Pi using python GUI tkinter and streamlit.

A33512 .4 Interface led, rgb led, ir sensor and dht11 with Raspberry Pi using python GUI.

A33512 .5 Test and Debug ESP32 MicroPython and Raspberry Pi python GUI programs.

3.Course Syllabus:

PART A: List of MicroPython Programs using ESP32

- 1) Program to blink an LED.
- 2) Program to turn on and off an LED using push button.
- 3) Program to display potentiometer values on serial monitor using serial port.
- 4) Program to control brightness of the LED using potentiometer.
- 5) Program to display string on LCD.
- 6) Program to interface DHT sensor and display the value on LCD
- 7) Program to Data Logging of DHT11 with Thingspeak server
- 8) Program to Controlling LED with adafruit-io server.

PART – B: List of Python GUI Programs using Raspberry pi

- 1) Controlling LED using tkinter and streamlit.
- 2) Controlling brightness of LED using tkinter and streamlit.
- 3) Changing the color of an RGB LED using tkinter and streamlit.
- 4) Reading IR Proximity sensor data using tkinter and streamlit.
- 5) Reading DHT11 data using tkinter and streamlit.
- 6) Controlling GPIO Outputs using a web interface
- 7) Controlling Red, Orange and Green LEDs with adafruit-io server.
- 8) Ultrasonic Sensor Data Logger with thingspeak server

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks And Materials:

Textbooks

- 1) Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain. Internet of Things with Raspberry Pi and Arduino, 1st edition, CRC Press, 2019
- 2) AgusKurniawan, MicroPython for ESP32 Development, 1st edition, PE Press Publishing, 2017

Reference Books:

- 1) Simon Monk, O'Reilly (SPD), Raspberry Pi Cookbook, Software and Hardware Problems and solutions, 2016, ISBN 7989352133895.

Online Learning Resources:

- 1) <https://randomnerdtutorials.com/micropython-program-esp32-esp8266-mu-editor/>
- 2) <https://docs.streamlit.io/library/get-started>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33513 - Java Programming 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 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, multi-threading, files and swings and give effective solution programmatically. This helps the students to choose their career as software engineers.

Course Pre-requisite

No Pre-requisite

2. Course Outcomes (CO):

After completion of the course, students will be able to

A33513.1 Design solutions for the problems of general purpose applications using object oriented concepts.

A33513.2 Generate reusable codes using inheritance, user defined packages and interface.

A33513.3 Write robust and efficient code using exception handling and multi-threading concepts.

A33513.4 Implement collection frameworks and file handling techniques to store and retrieve data.

A33513.5 Design user interface using swings.

3. Course Syllabus

List of 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. Develop a swing program for waving a Flag using applets and threads.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks And Materials:

Texbooks

- 1) P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.
- 2) P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007.

Reference Books:

- 1) Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.
- 2) Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33114 - Web Application Development

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

1.Course Description:

Course Overview

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

Course Pre-requisite

Fundamentals of Programming and Internet

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33114.1 Programming skills in Html5, CSS3, and Bootstrap 4.

A33114.2 Developing skills of Web Applications user interactions using JavaScript (i.e. ES6+)

A33114.3 Web application Development Database with React and React Native.

3.Course Syllabus

List of Experiments

Week – 1: HTML LAYOUTS AND LINKS a. Develop a web application to control over different layouts. b. Create a webpage with HTML describing your department use paragraph and list tags. c. Apply various colors to suitable distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags. d. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.

Week – 2: WEB APPLICATION DESIGN FORMTTING a. Develop a web application with background banner image and navigation menus. b. Develop a web application with responsive images. c. Develop a web application using left menu. d. Develop setting to change the theme of entire web Application.

Week – 3: INTRODUCTION TO RESPONSIVE INTERFACE USING BOOTSRAP. a. Write code for developing responsive web application with Admin panel and tables with static data

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Week – 4: BUILDING INTERFACES USING JAVASCRIPT a. Set up the Folder Structure. b. Write the Model code and initialize the application. c. Implement the list objects and use cases. d. Implement the create object use case. e. Implement the update object use case.

Week – 5: INTRODUCTION TO INTERACTIVE FORMS AND AJAX DATA BINDING

a. Developing Web Page Styles using JavaScript and CSS, b. Develop Script interactive forms c. Data binding using Ajax.

Week – 6: REACT ENVIRONMENT SETUP

b. Integration with Existing Apps. c. Running on Device. d. Debugging e. Testing f. Write source code using Typescript.

Week – 7: PROGRAMMING WITH REACT

a. Basics Interactive examples. b. Function Components and Class Components c. React Native Fundamental, Handling Text Input, d. Using a scroll View, using List View. e. Platform Specific Code.

Week – 9: PHP SESSIONS BOX React FOR DATA VISUALIZATION

a. Introduction and scaffolding the Project. b. Pages and Layout. c. Working with an API, CSS-in-JS. d. Dynamic Pages and React Hooks. e. Custom React Hooks, Dynamic CSS-in-JS. f. Finishing up and Deployment. g. Optimization and PWA.

Week – 10: CHAT APPLICATION

a. Firebase Environment. Introduction and Scaffolding the project. b. Private and Public pages, Context API. c. Creating Side bar and Dashboard d. Creating and displaying Chat Rooms. e. Creating Layout for Chat page.

4.Textbooks And Materials:

References:

1. Adam Boduch and Roy Derks, "React and React Native: A Complete Hands-on Guide to Modern Web and Mobile Development with React.js", 3rd Edition, 2020.
2. W Hans Bergsten, "Java Server Pages", O'Reilly, 3rd Edition, 2003.
3. D. Flanagan, "Java Script", O'Reilly, 6th Edition, 2011.
4. Jon Duckett, "Beginning Web Programming", WROX, 2nd Edition, 2008.

Online Learning Resources/Virtual Labs:

1. <https://nodejs.org/en/>
2. <https://expressjs.com/>
3. <https://www.mongodb.com/>
4. <https://reactjs.org/>
5. <https://www.netlify.com/>

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
3	0	0	42	0	0	0	40	60	100

1.Course Description:

Course Overview

The main objective of this course is to develop students' sensibility with regard to issues of gender in contemporary India and to provide a critical perspective on the socialization of men and women. It also introduces students to information about some key biological aspects of genders to expose the students to debates on the politics and economics of work. This course helps the students to reflect critically on gender violence.

Course Pre-requisite

No Pre-requisite

2.Course Outcomes (CO):

After completion of the course, students 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:1 UNDERSTANDING GENDER

Gender: Why should we study it Socialization: Making Women, Making Men Introduction, preparing for Woman hood, growing up Male, First lessons in Caste, Different Masculinities

Unit:2 GENDER AND BIOLOGY

Missing Women: Sex Selection and its consequences Declining Sex Ratio, Demographic Consequences Gender Spectrum: Beyond the Binary Two or Many? Struggles with Discrimination, Additional Reading: Our Bodies, Our Health.

Unit:3 GENDER AND LABOUR:

Housework: The Invisible Labour "My Mother Doesn't Work". "Share the Load", Women's Work: Its Politics and Economics Fact and Fiction, Unrecognized and Unaccounted work

Unit:4 ISSUES OF VIOLENCE

Sexual Harassment: Say No! Sexual Harassment, not Eve-Teasing-Coping with Everyday Harassment Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Unite [Film], Rebuilding Lives Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life....."

Unit:5 GENDER STUDIES:

Knowledge: Through the Lens of Gender Point of View, Gender and the Structure of Knowledge. Who's History? Questions for Historians and Others Reclaiming a Past, Writing other Histories.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Text Book And Materials:

Textbooks

Suneeta, Uma Bhugubanda, *Towards a world of equals: A Bilingual Textbook on gender*

Reference Books

1. Sen, Amartya. "More than one Million Women are Missing." *New York Review of Books* 37,20 (20 December1990). Print
2. TripiLahiri, By the Numbers: Where Indian Women Work, *Women's Studies Journal*(14November2012)<<http://blogs.wsj.com/Indiarealtime/2012/11/14/by-the-numbers-where-Indian-Women-work/>>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33526 - Machine Learning Essentials (Professional Elective Course– I)

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

1.Course Objectives:

The course is introduced for students to

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

Pre-requisite Fundamentals of Computers and Programming

2.Course Outcomes (CO):

After completion of the course, students will be able to

- A33526.1 Identify machine learning techniques suitable for a given problem.
- A33526.2 Solve the problems using various machine learning techniques.
- A33526.3 Design application using machine learning techniques.
- A33526.4 Able to apply Regression methods for a given problem.
- A33526.5 Design of clustering techniques for a given problem.

3.Course Syllabus:

UNIT – I Introduction to Machine Learning &Preparing to Model

What is Machine Learning?, Types of machine Learning.

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

UNIT – II Evaluation &Basics of Feature Engineering

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

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

UNIT – III Bayesian Concept Learning & Supervised Learning: Classification

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

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

UNIT – IV Supervised Learning: Regression

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT – V

Unsupervised Learning

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

4.Textbooks:

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

Reference Books:

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

Online Learning Resources:

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33527 - Distributed Computing (Professional Elective Course-1)

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

1. To provide students with contemporary knowledge in distributed systems
2. To equip students with skills to analyze and design distributed applications.
3. To provide master skills to measure the performance of distributed synchronization algorithms

Course Pre-requisite:

Fundamentals of Computers and Programming

2.Course Outcomes (CO):

After completion of the course, students will be able to

- A33527.1 Demonstrate knowledge of the basic elements and concepts related to distributed system technologies.
- A33527.2 Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware.
- A33527.3 Analyze the various techniques used for clock synchronization and mutual exclusion
- A33527.4 Demonstrate the concepts of Resource and Process management and synchronization algorithms
- A33527.5 Demonstrate the concepts of Consistency and Replication Management.

3.Course Syllabus

UNIT – I Introduction to Distributed Systems

Characterization of Distributed Systems: Issues, Goals, and Types of distributed systems, Distributed System Models, Hardware concepts, Software Concept. Middleware: Models of Middleware, Services offered by middleware, Client Server model.

UNIT – II Communication

Layered Protocols, Interprocess communication (IPC): MPI, Remote Procedure Call (RPC), Remote Object Invocation, Remote Method Invocation (RMI) Message Oriented Communication, Stream Oriented Communication, Group Communication

UNIT – III Synchronization

Clock Synchronization, Logical Clocks, Election Algorithms, Mutual Exclusion, Distributed Mutual Exclusion-Classification of mutual Exclusion Algorithm, Requirements of Mutual Exclusion Algorithms, Performance measure. 3.2 Non Token based Algorithms: Lamport Algorithm, Ricart–Agrawala’s Algorithm, Maekawa’s Algorithm

UNIT – IV Resource and Process Management

Desirable Features of global Scheduling algorithm, Task assignment approach, Load balancing approach, load sharing approach 4.2 Introduction to process management, process migration, Threads, University of Mumbai, B. E. (Computer Engineering), Rev. 2016 114 Virtualization, Clients, Servers, Code Migration

UNIT – V Distributed File Systems and Name Services

Introduction and features of DFS, File models, File Accessing models, File-Caching Schemes, File Replication, Case Study: Distributed File Systems (DSF), Network File System (NFS), Andrew File System (AFS).

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks And Materials:

Textbooks:

1. Andrew S. Tanenbaum and Maarten Van Steen, —Distributed Systems: Principles and Paradigms, 2nd edition, Pearson Education.
2. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.

Reference Books:

1. A. S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
2. M. L. Liu, —Distributed Computing Principles and Applications]], Pearson Addison Wesley, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33528 - Software Testing Methodologies (Professional Elective Course – 1)

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:

- To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.
- To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
- It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.
- It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.

Course Pre-requisite: Nil

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33528.1 Know the basic concepts of software testing and its essentials.

A33528.2 Able to identify the various bugs and correcting them after knowing the consequences of the bug.

A33528.3 Use of program's control flow as a structural model is the corner stone of testing.

A33528.4 Performing functional testing using control flow and transaction flow graphs.

3.Course Syllabus:

UNIT – I

Introduction:-Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs, Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT – II

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT – III

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT – IV

Paths, Path products and Regular expressions:- path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:- overview, decision tables, path expressions, kv charts, specifications.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT – V

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips. Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools

4.Textbooks And Materials:

Textbooks:

1. Software Testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

Reference Books:

1. The craft of software testing – Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33529 - Theory of Computation

(Professional Elective Course – 1)

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:

- Types of grammars and models of automata.
- Limitation of computation: What can be and what cannot be computed.
- Establishing connections among grammars, automata and formal languages.

Course Pre-requisite

No Pre-requisite

2.Course Outcome:

After successfully completing the course the student should be able to

A33529.1 Compare and analyze different computational models.

A33529.2 Apply regular expressions to computer languages.

A33529.3 Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.

A33529.4 Design parsers using top-down as well as bottom-up paradigms

A33529.5 Understanding the intermediate code generation.

3. Course Syllabus.

Unit:1 Finite Automata

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

Unit:2 Regular Expression

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

Unit:3 Context Free Grammars

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

Unit:4 Syntax Analysis

Top-Down Parsing - Bottom-Up Parsing - Operator-Precedence Parsing – LR-Parsers, SLR, CLR, and LALR.

Unit:5 Intermediate Code Generation & Code Optimization

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks And Materials:

Text Book(s)

1. J. E. Hopcroft, R. Motwani and J.D. Ullman, —Introduction to Automata Theory, Languages and Computation||, Third Edition, Pearson Education, India 2008. ISBN: 978-8131720479
2. K. Peter Linz, —An Introduction to Formal Languages and Automata||, Sixth Edition, Jones & Bartlett, 2016. ISBN: 978-938432321

Reference Books

1. K. Krithivasan and R. Rama, —Introduction to Formal Languages, Automata and Computation||, Pearson Education, 2009. ISBN: 978-8131723562
2. Michael Sipser, Introduction of the Theory and Computation, Cengage; 3rd edition, 2014, ISBN: 978-8131525296
3. Dexter C. Kozen, —Automata and Computability||, Springer; Softcover reprint of the original 1st ed. 1997 edition. 2012
4. John C Martin, —Introduction to Languages and the Theory of Computation||, McGraw Hill Publishing Company, Fourth Edition, 2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33515 - IoT Application Development on Cloud Platforms

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 IoT application on Cloud Platform for IoT products and services. In this course students study – the four pillars of IoT, DNA of IoT, Middleware, Cloud computing and cloud of things. This course has simple examples with integration of techniques turned into an application.

Course Pre-requisite

Internet of Things

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33515.1 Perform Data Acquisition and analysis using Cloud and Tkinter.

A33515.2 Understand the vision of IoT from a global context.

A33515.3 Determine the Market perspective of IoT.

A33515.4 Use of Devices, Gateways and Data Management in IoT.

A33515.5 Building state of the art architecture in IoT.

3.Course Syllabus :

UNIT - I

Four Pillars of IoT: The Horizontal, verticals and Four Pillars, M2M: The Internet of Devices, RFID: The Internet of Objects, WSN: The Internet of Transducers, SCADA: The Internet of Controllers.

UNIT - II

The DNA of IoT: DCM: Device, Connect and Manage, Device: Things That Talk, Connect: Via Pervasive Networks, Manage: To Create New Business Value.

UNIT - III

Middleware and IoT: An Overview of Middleware, Communication Middleware for IoT, LBS and Surveillance Middleware.

UNIT - IV

Cloud Computing: What is Cloud Computing? Grid/SOA and Cloud Computing, Cloud Middleware, NIST's SPI Architecture and Cloud Standards, Cloud Providers and Systems.

UNIT - V

The Cloud of Things: The Internet of Things and Cloud Computing, Mobile Cloud Computing, MAI Versus XaaS: The Long Tail and the Big Switch, The Cloud of Things Architecture.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks and Materials :

Textbooks:

1. The Internet of Things in the Cloud, A Middleware Perspective, Honbo Zhou, CRC Press.

Reference Books:

1. The Convergence of Internet of Things and Cloud for Smart Computing, Parishit N. Mahalle, Nancy Ambritta P., Gitanjali Rahul Shinde and ArvindVinayak Deshpande, CRC Press.

Online Learning Resources:

1. IoT Cloud Application | IoT Cloud Service Providers (embitel.com)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33516 - Mobile Application Development for 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 mobile applications for internet of things (IoT) products and services. In this course students study – Android Studio IDE using Java and how to connect android apps to I/O devices, IoT servers, arduino and esp32. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course has simple examples with integration of techniques turned into an application.

Course Pre-requisite:

Java, Arduino

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33516.1 Emulate the Android Apps on Emulator and Handset.

A33516.2 Design User Interfaces for Mobiles using Android Studio.

A33516.3 Apply Bluetooth APIs for developing Bluetooth Apps.

A33516.4 Monitor and Control I/O devices via Bluetooth using Smart Phone and Arduino.

A33516.5 Create Mobile Apps for IoT using Firebase cloud.

3.Course Syllabus :

UNIT – I

INTRODUCTION TO ANDROID

Introduction to Android, Understanding the Android Software Stack, Installing Java Developer Kit, Installing the Android Studio, Creating Android Virtual Devices, Creating the First Android Project, Android Debug Bridge (ADB), Android Emulator, Launching Android Applications on a Handset.

UNIT – II

ANDROID COMPONENTS & BASIC WIDGETS

Understanding the Role of Android Application Components, Understanding the utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Overview of types of Layouts, Overview of basic widgets-textview, button, edittext, android listview, Displaying messages through Toast, Changing Activity by using button and Intent.

UNIT – III

BLUETOOTH SETUP

Overview of Bluetooth APIs-Bluetooth Adapter, Bluetooth Device, Bluetooth Socket, Enabling Bluetooth, finding Bluetooth devices, connecting to Bluetooth device, transfer Bluetooth data, HC-05 Bluetooth Module-Introduction, Pinout, Pin description.

UNIT – IV

ANDROID & ARDUINO BLUETOOTH PROGRAMMING

Controlling LED via Bluetooth: Hardware and Software requirements, Creating App, Writing the Arduino sketch.

Reading a Potentiometer via Bluetooth: Hardware and Software requirements, Creating App, Writing the Arduino sketch.

UNIT – V

FIREBASE CLOUD FOR IOT

Introduction to Firebase, Features, steps to creating account in Firebase, steps to creating Firebase project.

Controlling LED via Firebase: Hardware and Software requirements, Creating App, Writing the Arduino sketch.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks and Materials :

Textbooks:

1. Beginning Android programming with android studio 4th edition, J. F. DiMarzio, Published by John Wiley & Sons, Inc.
2. Arduino Android Blueprints, Marco Schwartz, Stefan Buttigieg, PACKT Publishing, 2014.

Reference Books:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Internet of Things A to Z Technologies and Applications, Qusay F. Hassan, IEEE Press, Wiley.

Online Learning Resources:

1. <https://developer.android.com/guide/topics/connectivity/bluetooth>
2. <https://firebase.google.com/docs/android/setup>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33517 - 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 Overview:

- Discuss the importance of Data Visualization
- Demonstrate story telling
- Explain the environment of Tableau

Course Pre-requisite

DBMS, Fundamentals of Graphics

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33517.1 Effectively present the data

A33517.2 Draw insights from the data

A33517.3 Use Tableau

3.Course Syllabus:

UNIT – I

Introduction, The importance of Context, Choosing and effective visual

UNIT – II

Clutter is your enemy, Focus your audience's attention, Lessons in Storytelling

UNIT – III

Communicating data: A step in the process, a model of communication, Three types of communication problems, and six principles of communicating data.

Introduction to Tableau: Using Tableau, Tableau products, Connecting to data. How much and How many: Communicating how much, communicating how many Ratios and Rates: Ratios, Rates

UNIT – IV

Proportions and Percentages: Part to whole, current to historical, actual to target. Mean and Median

Variation and Uncertainty: Respecting variation, Variation over time-Control charts, Understanding uncertainty

UNIT – V

Multiple Quantities: Scatterplots, Stacked Bars, Regression and Trend Lines, The Quadrant Chart

Changes over time: The origin of time charts, the line chart, the dual axis line chart, the connected scatterplot, the date filed type and seasonality, the timeline, the slope graph

Maps and Location: One special map, circle maps, filled maps, dual encoded maps.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks and Materials :

Textbooks:

1. Cole NussbaumerKnaflc, Storytelling with data, Wiley
2. Ben Jones, Communicating Data with Tableau, O'Reilly

Reference Books:

1. A Julie Steele and Noah Iliinsky, Designing Data Visualizations: Representing Informational Relationships, O'Reilly.
2. Andy Kirk, Data Visualization: A Successful Design Process, PAKT.
3. Scott Murray, Interactive Data Visualization for Web, O'Reilly.

Online Learning Resources:

1. Data Analysis and Visualization Foundations | Coursera
2. Data Visualization | Coursera

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33518 - IoT Application Development on Cloud Platforms 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 course provides the students with the knowledge of Cloud account creation, widgets creation, linking widgets with IoT things, designing dashboards on cloud platform. It also provides the knowledge of linking the Alexa with arduino IoT Cloud. This laboratory course helps to the students to use these experiments in IoT based projects.

Course Pre-requisite

Arduino Programming

2.Course Outcomes (CO):

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

- A33518.1 Create Cloud platform account and widget creation.
- A33518.2 Connect the Cloud widgets with IoT things.
- A33518.3 Design dashboards on cloud platforms.
- A33518.4 Link the Alexa with Arduino IoT Cloud.
- A33518.5 Develop Cloud platform based IoT Applications.

3.Course Syllabus :

List of Experiments:

1. Create any cloud platform account, explore IoT services and register a thing on the platform.
2. Control an LED through Arduino IoT Cloud using Switch widget.
3. Push sensor data to Arduino IoT Cloud.
4. Control an actuator through Arduino IoT Cloud using Messenger widget.
5. Read the data from Arduino IoT Cloud Messenger widget and display it on LCD.
6. Control the Servo motor angular position through cloud.
7. Control the direction of dc motor through cloud.
8. Design a weather monitoring system using Arduino IoT Cloud.
9. Design an Arduino IoT Cloud Enabled Home.
10. Design to control an actuator using Alexa and Arduino IoT Cloud.

4.TextBooks and Materials:

Textbooks:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012.
2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011.

References:

1. ArshdeepBahga, Vijay Madiseti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33522 - Mobile Application Development for IOT 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 course provides the students with the knowledge of android studio programming, Bluetooth app programming, and firebase cloud programming in android to monitor and control I/O devices. It also provides the knowledge of developing a mobile apps for IoT. This laboratory course helps to the students to use these experiments in IoT based projects.

Course Pre-requisite :

Java, Arduino

2.Course Outcomes (CO):

After completion of the course, students will be able to

- A33519.1 Design User Interfaces using android studio.
- A33519.2 Execute the Android Apps on Emulator and Mobiles.
- A33519.3 Test and Debug the Android Programs.
- A33519.4 Monitor and Control I/O devices via Bluetooth using Smart Phone and Arduino.
- A33519.5 Create Mobile Apps for IoT using Firebase cloud.

3.Course Syllabus :

List of Experiments:

1. Install Android Studio and Configure Latest Android SDKs and Android Virtual Devices.
2. Build and Run Hello World Application on the Virtual Device.
3. Create an application to toggle the text like ON and OFF using on button and off button and also same using switch.
4. Create an application to change the Activity from activity1 to activity2 using button.
5. Create an application to get Android app version names list when user press the get button and display the selected app version using toast.
6. Create an application to get Bluetooth paired list and connect to selected bluetooth device and display the message Bluetooth connected using toast.
7. Create an application to control Arduino LED via Bluetooth using Smart Phone.
8. Create an application to display Arduino potentiometer values on Smart Phone via Bluetooth.
9. Create an application to control Arduino LED via Firebase cloud using Smart Phone.
10. Create an application to display Arduino potentiometer values on Smart Phone via Firebase.

4.Textooks and Materials:

References:

1. Beginning Android programming with android studio 4th edition, J. F. DiMarzio, Published by John Wiley & Sons, Inc.
2. Arduino Android Blueprints, Marco Schwartz, Stefan Buttigieg, PACKT Publishing, 2014.

Online Learning Resources:

1. <https://developer.android.com/guide/topics/connectivity/bluetooth>
2. <https://firebase.google.com/docs/android/setup>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33520 - Data Visualization Techniques 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:

- Discuss concepts and principles of data visualization particularly related to decision making.
- Investigate technologies and practices for visualizing data as part of a data management and analytics system.
- Apply user interface design principles and practices to develop interactive data visualizations.
- Design effective dashboard for decision making at various levels.
- Conduct research on relevant data visualization topics.

Course Pre-requisite

Fundamentals of programming, python, DBMS

2.Course Outcomes (CO):

At the end of the course students will be able to

A33520.1 Understand and describe the main concepts of data visualization

A33520.2 Publish the created visualizations to Tableau Server and Tableau Public

A33520.3 How to recognize good (and bad) data visualizations, how to interpret a data visualization, and Using shapes, colors, text and layout appropriately

A33520.4 Identifying stories and insights in data, preparing data for visualization, and create several different charts using Tableau.

3.Course Syllabus:

List of Experiments:

1. Connecting to the data
2. Formatting and insertion of data
3. Creating worksheets, navigating the sheets, applying filters, aggregating the data
4. Organize the data into dashboards
5. Create story
6. Develop interactive plots in Python
7. Create Time series Data Visualization in Python
8. Visualization of Semi-Structured data
9. Create Sales Growth Dashboard – for the tracking of sales teams progress
10. Design Social media Dashboard – find how well your sponsored social activating are performing, monitor your PPC campaigns
11. Develop Healthcare Data Dashboard – Allows hospital administrators to manage and identify patient hazards from a single screen.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks and Materials:

References:

1. Andy Kirk, Data Visualization A Handbook for Data Driven Design, Sage Publications, 2016
2. Philipp K. Janert, Gnuplot in Action, Understanding Data with Graphs, Manning Publications, 2010

Online Learning Resources/Virtual Labs:

1. Data Visualization with Tableau | Coursera

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30021 - Professional English Communication Skills

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

1.Course Description

Course Overview

English language connects people from different regions, cultures and nations. English language has a determining effect on the job opportunities and professional growth of the student. Due to the changes in the world economy, Multinational companies have gained ground and also have become more competent. The ability to use a language efficiently is very much required to remain employable. The ability to express fluently in both written as well as oral form of language is very much essential for the career growth. In the corporate world, proper English means both the ability to make grammatically correct sentences and also other related skills for effective communication like presentation skills, convincing and negotiation skills and interpersonal. The student has to update according to the ongoing changes and advancements. The situation in most of the companies has changed, the mere domain knowledge doesn't guarantee one a good job. The emphasis should be on functional English usage exercises. In order to strengthen, the English speaking ability of the present generation, the syllabus framed focuses on practical oriented exercises and real life situations than mere study of literature.

Course Pre-requisite:

Communicative English, Communicative English Lab

2.Course Outcomes (CO):

After completion of the course, students will be able to

- A30021.1 Use techniques at different levels to convince the employers.
- A30021.2 Use technology to convince the audience with skills.
- A30021.3 Realize where exactly he has to improve.
- A30021.4 Communicate effectively using the ICT tools.
- A30021.5 Learn and be competent in heterogeneous groups.

3.Course Syllabus:

List of Experiments:

1. Icebreaker activities
2. Listening Comprehension
3. Reading Comprehension
4. Power Point Presentation
5. Group Discussion
6. Debate
7. Project Report Writing
8. SWOT and TOWS Analysis
9. Profiling a Company
10. Email writing
11. Application Letter
12. Etiquettes

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks and Materials :

References:

1. Rizvi, M. Ashraf, *Effective Technical Communication*, Noida, McGraw-Hill Education. 2009.

Online Learning Resources/Virtual Labs:

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30036 - Indian Constitution and Multiculturalism

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

1.Course Description

Course Overview:

The students will be able to learn:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

CoursePre-requisite

Nil

2.Course Outcomes (CO):

After completion of the course, students will be able to

A30036.1 Differentiate between structure and functions of state secretariat

A30036.2 Understand historical background of the constitution making and its importance for building a democratic India.

A30036.3 Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.

A30036.4 Understand the value of the fundamental rights and duties for becoming good citizen of India.

A30036.5 Analyze the decentralization of power between central, state and local self-government.

3.Course Syllabus :

Unit-I

Introduction to Indian Constitution – Constitution -Meaning of the term - 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's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions.

Unit-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions.

Unit-IV

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –ZillaParishath - Elected officials and their roles – CEO,ZillaParishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Unit-V

Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.TextBooks and Materials :

Text Books:

- 1.Durga Das Basu, “ Introduction to the Constitution of India”, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. SubashKashyap, “Indian Constitution”, National Book Trust.

References:

- 1) J.A. Siwach, “Dynamics of Indian Government & Politics”.
- 2) H.M.Sreevai, “Constitutional Law of India”, 4th edition in 3 volumes (Universal Law Publication)
- 3) J.C. Johari, “Indian Government andPolitics”, Hans India
- 4) M.V. Pylee, “Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice”, Hall of India Pvt. Ltd.. New Delhi

Online Learning Resources/Virtual Labs:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33530 - Cloud Computing

Professional Elective Course– II

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

1.Course 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-requisite

Fundamentals of Computers and Networking

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33530.1 Analyze cloud delivery models for better architecture.

A33530.2 Implement infrastructure as a service model for industrial applications.

A33530.3 Organize the cloud platform model for optimization services.

A33530.4 Develop various application software with software as service.

A33530.5 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

4.Textbooks and Materials :

Textbooks:

- 1.RajkumarBuyya, James Broberg, and Andrzej Goscinski, Cloud Computing: Principles and Paradigms by Wiley Press, New York, USA, 2017.
- 2.Cloud computing A hands-on Approach|| By ArshdeepBahga, Vijay Madiseti, Universities Press, 2016

Reference Books:

1. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, SThamaraiSelvi, TMH
2. Cloud computing A Hands-On Approach by ArshdeepBahga and Vijay Madiseti.
3. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.
4. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
5. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly, SPD, rp2011.
6. Essentials of Cloud Computing by K. Chandrasekaran. CRC Press.

Online Learning Resources:

1. Cloud computing - Course (nptel.ac.in)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33531 - Deep Learning with IOT

Professional Elective Course– II

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

1.Course Description:

Course Overview:

- Demonstrate the major technology trends driving Deep Learning
- Explore Fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a Neural network's architecture

Course Pre-requisite

Machine Learning

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33531.1 Demonstrate the mathematical foundation of neural network

A33531.2 Understand the architecture of a deep neural network

A33531.3 Build a Convolutional neural network

A33531.4 Build and train RNN and LSTMs

3.Course Syllabus :

UNIT – I **Deep Learning and Linear Algebra**

Deep Learning: AI vs ML vs DL vs DS, Deep Learning, why Deep learning, architecture, types of deep learning, applications, advantages and disadvantages.

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

UNIT – II **Machine Learning basics, Deep Feed forward Networks**

Deep Feed forward Networks: ANN, Perceptron, forward propagation, backward propagation, activation function, chain rule of derivatives, vanishing, gradient problem, and loss function.

Optimizers: Gradient descent, stochastic gradient descent, mini batch SGD, SGD with momentum, adagrad.

UNIT – III **Regularization for Deep Learning, Deep Models**

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Early stopping, Multitask Learning.

UNIT – IV **Convolutional Networks**

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT – V

IoT Analysis With Deep Learning

Deep learning libraries - Tensor Flow/Keras, IoT data analysis using Deep Neural Network, Convolution Neural Network for image classification.

4.Textbooks and Materials:

Textbooks:

- 1) Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MIT Press, 2016.
- 2) Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

Reference Books:

- 1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
- 2) Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O'Reilly, Shroff Publishers, 2019.

Online Learning Resources:

- 1) <https://keras.io/datasets/>
- 2) <http://deeplearning.net/tutorial/deeplearning.pdf>
- 3) <https://arxiv.org/pdf/1404.7828v4.pdf>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33532 - WEARABLE COMPUTING

Professional Elective Course– II

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

1.Course Description

Course Overview:

- To understand advanced and emerging technologies in wearable computing.
- To learn how to use software programs to perform varying and complex tasks.
- Expand upon the knowledge learned and apply it to solve real world problems.

Course Pre-requisite

IoT

2.Course Outcomes (CO):

After completion of the course, students will be able to

- A33532.1 Develop Android and Wear applications for Android phone and wearable device, including handling and making device data ready for Google Fi.
- A33532.2 Learn about software, hardware tools, protocols and component's required for Wearable Computing.
- A33532.3 Enable to explore innovations with Wearable's.
- A33532.4 Learn about the requirements to design Frameworks for Wearable Computing.
- A33532.5 Exploring regulatory systems—their structures, constraints, and possibilities.

3.Course Syllabus :

UNIT – I

Body Sensor Networks-Introduction, Typical m-Health System Architecture, Hardware Architecture of a Sensor Node, Communication Medium, Power Consumption Considerations, Communication Standards, Network Topologies, Commercial Sensor Node Platforms, Bio-physiological Signals and Sensors, BSN Application Domains

BSN Programming Frameworks-Introduction, Developing BSN Applications, Programming Abstractions, Requirements for BSN Frameworks, BSN Programming Frameworks, Signal Processing In-Node Environment-Introduction, Background, Motivations and Challenges, The SPINE Framework

UNIT – II

Task-Oriented Programming in BSNs-Introduction, Motivations and Challenges, SPINE2 Overview, Task-Oriented Programming in SPINE2, SPINE2 Node-Side Middleware, SPINE2 Coordinator, SPINE2 Communication Protocol, Developing Application in SPINE

Autonomic Body Sensor Networks-Introduction, Motivations and Challenges, State-of-the-Art, SPINE: Task-Based Autonomic Architecture, Autonomic Physical Activity Recognition

Agent-Oriented Body Sensor Networks-Introduction, Agent-Oriented Computing and Wireless Sensor Networks, Mobile Agent Platform for Sun SPOT (MAPS), Motivations and Challenges, State-of-the-Art: Description and Comparison, Agent-Based Modelling and Implementation of BSNs, Engineering Agent-Based BSN Applications: A Case Study

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT – III

Collaborative Body Sensor Networks-Introduction, Motivations and Challenges, State-of-the-Art, Reference Architecture for Collaborative BSNs, C-SPINE: CBSN Architecture

Integration of Body Sensor Networks and Building Networks-Introduction, Building Sensor Networks and Systems, Building Management Framework, Motivations and Challenges, Integration Layers. State-of-the-Art: Description and Comparison, An Agent-Oriented Integration Gateway, Application Scenarios

UNIT – IV

Development Methodology for BSN Systems- Introduction, Motivations and Challenges, SPINE-Based Design Methodology

SPINE-Based Body Sensor Network Applications- Introduction, Physical Activity Recognition, Step Counter, Emotion Recognition, Handshake Detection, Physical Rehabilitation

UNIT – V

Signal Processing In-Node Environment: Introduction, Background, Motivations and Challenges, SPINE Framework- Architecture, Programming Perspective, Optional SPINE Modules, High-Level Data Processing, Multiplatform Support.

4.Textbooks and Materials :

Textbooks:

1. Wearable Computing: From Modeling to Implementation of Wearable Systems Based on Body Sensor Networks, Giancarlo Fortino, Raffaele Gravina, Stefano Galzarano, Wiley, IEEE Press, 2018.

Reference Books:

1. Fundamentals of Wearable Computers and Augmented Reality, Second Edition by Woodrow Barfield 2015
2. Making Sense of Sensors: End-to-End Algorithms and Infrastructure Design by Omesh Tickoo, Ravi Iyer 2016.
3. Barfield, Woodrow, ed. Fundamentals of wearable computers and augmented reality, 1st edition, CRC press, 2015.

Online Learning Resources:

1. Wearable Computing – CodeReality.net

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33533 - Introduction to Industrial IoT

Professional Elective Course– II

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

1.Course Description

Course Overview:

Understand how IoT has become a game changer in the new economy where the customers are looking for integrated value.

Bring the IoT perspective in thinking and building solutions.

Learn about the tools and techniques that enable IoT solution and security aspects.

Knowledge about the design and analysis of Industry 4.0 Systems for Electronics Engineering students.

Course Pre-requisite

Internet of Things

2.Course Outcomes (CO):

After completion of the course, students will be able to

A33533.1 To understand architecture for Internet of Things.

A33533.2 To recognize various devices, sensors, actuators, and various processing paradigms for IoT.

A33533.3 To understand the basics of Networking and Security.

A33533.4 Ability to identify, formulate and solve engineering problems by using Industrial IoT.

A33533.5 Able to understand building blocks of Internet of Things and characteristics.

3.Course Syllabus:

UNIT - I

Overview of Internet of Things: Introduction, IOT Architecture, Application –based IOT protocols, Cloud Computing, Fog Computing, Sensor Cloud, Big Data.

Overview of Industry 4.0 and Industrial Internet of Things: IIoT- Prerequisites of IIOT, Basics of CPS, CPS and IIOT, Applications of IIoT.

UNIT - II

Industrial Internet of Things: Introduction, Industrial Internet Systems, Industrial sensing, Industrial sensing, Industrial Processes.

Business Models and Reference Architecture of IIoT: Definition of a business model, Business models of IOT, Business models of IIOT.

UNIT - III

Key Technologies: Off-site Technologies- Introduction, Cloud Computing- Necessity, Cloud Computing and IIoT, Industrial Cloud Platform Providers, SLA, Requirements of Industry 4.0, Fog Computing.

On-site Technologies- Introduction, Augmented Reality- History, Categorization, Applications, Virtual Reality- History, Categorization, and Applications.

UNIT - IV

Sensors: Introduction to Sensors, Characteristics-Sensor calibration, Sensor profile, Operating voltage, Sensor Categories. Actuators: Introduction, Thermal Actuators, Hydraulic Actuators, Pneumatic Actuators, Electromechanical Actuators.

UNIT - V

Machine Learning and Data Science in Industries: Introduction, Machine Learning, Categorization on ML, Applications and Data Science of ML in industries, Deep Learning,

4.Textbooks and Materials :

Textbooks:

- 1.S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.

Reference Books:

- 1.Industrial IoT. Available online: <https://medium.com/iotforall/whatproduct-managers-need-to-know-about-industrial-iot-8c92eec1d9d2>
- 2.IIoT Cloud Platforms. Available online: <https://fr.farnell.com/willthere-be-a-dominant-iiot-cloud-platform>.
- 3.Kajima, T. and Kawamura, Y., 1995. Development of a high-speed solenoid valve: Investigation of solenoids. IEEE Transactions on industrial electronics, 42(1), pp.1-8.

Online Learning Resources:

- 1.What is Industrial IoT : Industrial Internet of Things IIoT meaning | IoTDunia

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B.TECH. – COMPUTER SCIENCE AND ENGINEERING – INTERNET OF THINGS (CSO)

VII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
	Professional Elective-III	PE	3	1	0	3	40	60	100
	Professional Elective-IV	PE	3	1	0	3	40	60	100
	Professional Elective-V	PE	3	1	0	3	40	60	100
	Open Elective-III	OE	3	0	0	3	40	60	100
	Open Elective-IV	OE	3	0	0	3	40	60	100
A30022	*Professional Ethics	HS	3	0	0	3	40	60	100
A33550	Embedded C & Visual Programming Laboratory	PC	0	0	3	1.5	40	60	100
A33547	Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)	SI	0	0	0	3	100	0	100
TOTAL			19	00	2	23	380	420	800
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									
Honors/Minor courses(The hours Distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	70	100

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

*There is a provision for the Universities/Institutions to implement AICTE course “Universal Human Values 2: Understanding Harmony” under Humanities and social mandatory science Elective in seventh semester for 3 credits.

VIII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A33548	Project (Major Project) Project work, seminar and internship in industry (Internship along with Project Work)	PW	0	0	0	12	0	200	200
Internship (6 Months)									
TOTAL			0	0	0	12	0	200	200

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B.TECH. – COMPUTER SCIENCE AND ENGINEERING – INTERNET OF THINGS (CSO)

Professional Electives

Professional Elective – 3	
Course Code	Title of the Course
A33534	Network Security
A33535	Google Cloud Computing Foundations
A33536	Fundamentals of Cloud Storage Management
A33537	Principles of Virtualization
Professional Elective – 4	
Course Code	Title of the Course
A33538	Edge Computing
A33539	Computer Vision and Pattern Recognition
A33540	Block Chain Technology
A33541	IoT Visual Programming
Professional Elective – 5	
Course Code	Title of the Course
A33542	UML With IoT
A33543	Embedded Systems
A33544	Introduction to Industry 4.0 and IIoT
A33545	Quantum Computing

Open Elective – 3	
Course Code	Title of the Course
A30081	Research Methodologies
A30087	Entrepreneurship Development
A30281	Fundamentals of Electrical Engineering
A30382	Mechanical Technologies
Open Elective – 4	
Course Code	Title of the Course
A30085	Design Thinking
A30083	National Service Scheme
A30381	Optimization Techniques
A30484	Introduction to Embedded Systems

COURSE STRUCTURE
A33534 – NETWORK SECURITY

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

1. Course Description:

Course Overview:

This course provide the students with Knowledge of information security, application of each of confidentiality, integrity, authentication and availability, various cryptographic algorithms, cryptosystem, enhancements made to IPv4 by IP Sec, Intrusions and intrusion detection, fundamental ideas of public-key cryptography. Generate and distribute a PGP key pair and use the PGP package to send an encrypted emailmessage.

Pre-requisite

Computer networks
fundamentals

2.Course Outcomes (CO):

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

A33534.1 Understand basic cryptographic algorithms, message and web authentication and securityissues.

A33534.2 Identify information system requirements for both of them such as client and server.

A33534.3 Understand the current legal issues towards information security.

3.Course Syllabus:

UNIT – I Security Concepts

Information, security attacks and services. A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques.

UNIT – II Symmetric key Ciphers

Block Cipher principles, DES, 3DES, Block cipher modes of operation, Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange.

UNIT – III Cryptographic Hash Functions

Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signature, applications.

UNIT – IV Transport-level Security

Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH).

UNIT – V E-Mail Security

Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations.

4.Textbooks:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: AtulKahate, Mc Graw Hill, 3rd Edition

Reference Books:

- 1.Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
 - 2.Cryptography and Network Security: ForouzanMukhopadhyay, Mc Graw Hill, 3rd Edition Information Security, Principles, and Practice: Mark Stamp, Wiley India.
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33535 – GOOGLE CLOUD COMPUTING FOUNDATIONS

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 Google's Cloud platform, covering essential components like Google Cloud Console, Cloud SDK, and Cloud Shell. Participants will explore core services such as Compute, Data storage, Firestore, Bigtable, and Memorystore. Additionally, they will gain expertise in configuring identity management with Cloud Identity, managing access for users and groups, enabling administrator access, and setting up billing and cost controls, this course equips learners with the skills needed to effectively utilize and manage Google Cloud services.

Course Pre/Corequisites

Basics of Cloud Computing

2. Course Outcomes (COs)

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

A33535.1 Understand the basics of Google's Cloud platform and its core services.

A33535.2 Compare and contrast various Google Cloud core services.

A33535.3 Set up and configure IAM roles, users, and security groups.

A33535.4 Analyze the potential risks and security implications of granting administrator access.

A33535.5 Apply best practices for managing billing and cost controls in Google Cloud.

3. Course Syllabus

GETTING TO KNOW GOOGLE'S CLOUD: Introduction, Google Cloud Console, The Google Cloud SDK and Cloud Shell, The Google Cloud APIs, The Google Cloud mobile client, Organizing Google Cloud logically and physically.

GOOGLE'S CORE SERVICES: Compute, Data storage, Firestore (Datastore), Bigtable, Memorystore

IAM, USERS, GROUPS ACCESS: Configuring identity management – Cloud Identity setup, Adding an initial set of users and security groups – Cloud Identity managing users and acting as IdP, Cloud Identity managing IdP and an HR system managing users, Cloud Identity delegates all IdP and user management to an external provider

ADMIN ACCESS: Enabling administrator access – Verifying initial Google Cloud organization creation, Configuring organization administrator group access

SETTING UP BILLING AND COST: Understanding billing terminology, setting up billing and cost controls, how you pay, Cloud Billing, Google Cloud Billing best practices.

4. Books and Materials

Text Book(s)

- 1) Patrick Haggerty, *The Ultimate Guide to Building a Google Cloud Foundation*, Packt Publishing Ltd, July 2022

Online Learning Resources:

- 1) https://onlinecourses.nptel.ac.in/noc20_cs55/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33536 – FUNDAMENTALS OF CLOUD STORAGE 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 an overview and introduction to the different AWS storage services, including EBS Storage, An understanding of how to transfer data into and out of AWS, the knowledge to confidently select the most appropriate storage service for your needs

Prerequisites

Basic understanding of Cloud Computing.

2. Course Outcomes (COs)

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

A33536.1 Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.

A33536.2 Apply the fundamental concepts in data centers to understand the trade-offs in power, efficiency and cost Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing.

A33536.3 Outline their role in managing infrastructure in cloud computing.

A33536.4 Analyze various cloud programming models and apply them to solve problems on the cloud.

Syllabus:

Introduction to Information storage and Management: Information Storage: Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture, Data Center Infrastructure - Core elements- Key Requirements for Data Center Elements -Managing Storage Infrastructure, Key Challenges in Managing Information, Information Lifecycle - Information Lifecycle Management - ILM Implementation -ILM Benefits, and Summary

Storage System Environment: Components of a Storage System Environment – Host – Connectivity – Storage, Disk Drive Components –Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording – Logical Block Addressing, Disk Drive Performance -1 Disk Service Time, Fundamental Laws Governing Disk Performance, Logical Components of the Host - Operating System – Device Driver -Volume Manager - File System – Application, Application Requirements and Disk Performance, Summary

Backup and Recovery: Backup Purpose -Disaster Recovery - Operational Backup –Archival, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topologies - Serverless Backup, Backup Technologies -Backup to Tape - Physical Tape Library - Backup to Disk – Virtual Tape Library

Local Replication: Source and Target -Uses of Local Replicas, Data Consistency - Consistency of a Replicated File System - Consistency of a Replicated Database, Local Replication Technologies -

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Host-Based Local Replication - Storage Array-Based Replication, Restore and Restart Considerations - Tracking Changes to Source and Target, Creating Multiple Replicas, Management Interface

Managing the storage Infrastructure: Monitoring the Storage Infrastructure –Parameters Monitored - Components Monitored - Monitoring Examples - Alerts, Storage Management Activities - Availability management - Capacity management - Performance management - Security Management - Reporting- Storage Management Examples, Storage Infrastructure Management Challenges

4. Textbooks:

Text Book:

1. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill Publication

Reference Book:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33537- PRINCIPLES OF VIRTUALIZATION

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 host parcels out resources as the virtual machines need them. Affinity ensures that the wanted resources are dedicated to that virtual machine and are always available when the virtual machine requires them. Remember that virtual machines share system resources with all the other virtual machines on the same host. Virtualization in Cloud Computing also enables us to set up access control over the resources to secure them. It also enables resource sharing among multiple applications. Virtualization also enables efficient resource utilization, since it only provisions the requested amount of resources and not more.

2. Course Outcomes (COs)

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

A33537.1 Describe cloud concepts and types of cloud Migration and governance in cloud

A33537.2 Enumerate basic concepts of Virtualization

A33537.3 Illustrate deployment of VMW are Install Virtual PC

A33537.4 create and manage virtual hard disks

3. Course Syllabus

UNIT 1

Introduction

Introduction to Virtualization - Types of virtualization Difference between cloud and virtualization Physical infrastructure and virtual infrastructure Virtualization approaches Partitioning Hosting-Isolation Hardware independence Virtual machine - Hypervisor - Types of hypervisor.

UNIT 2

Virtual machine manager Types of hypervisor Introduction to datacenter virtualization Esxi - Difference between Esxi and Esx - Versions of Esxi - Installation and configuration of Esxi 6.0 - vSphere 6.0. Components of VMware vSphere - vSphere 6.0: Overview and Architecture - Topology of vSphere 6.0 Data Center - vSphere 6.0 Configuration.

UNIT 3

Maxi mumsv Center Server - vCenter Server Features - Certificate Management - Alarms and Alerts - Monitoring Features - Template Management - Linked Mode Deployment - Storage Features in vSphere - Shared Storage - Storage Protocols - Datastores - Virtual SAN - Virtual Volumes - Networking Features in vSphere - Virtual Networking - Virtual Switches and its types.

UNIT 4

Features of vSphere and NSX

vSphere Resource Management Features - vMotion - Distributed Resource Scheduler (DRS) - - Distributed Power Management (DPM) - Storage vMotion - Storage DRS - Storage I/O Control - Network I/O Control - vSphere Availability Features - vSphere Data Protection - High Availability - Fault Tolerance - vSphere Replication - Introduction to NSX.

UNIT 5

VSphere Solutions to Data Center Challenges and vSphere Security

Challenges - Availability Challenges - Scalability Challenges - Management Challenges - Optimization Challenges - Application Upgrade Challenges - Cloud Challenges - Security - Describe the features and benefits of VMware Platform Services Controller - Configure ESXi host access and authorization - Secure ESXi - vCenter Server - and virtual machines - Upgrade ESXi and vCenter Server instances.

4. Textbooks:

Text Books:

1. Virtualization Essentials Paperback – 26 Apr 2012 by Matthew Portnoy - wiley publications
2. VMware Cookbook Paperback – 17 Jul 2012 by Troy - Shroff/O'Reilly; Second edition (17 July 2012).

Reference Book:

1. Mastering VMware vSphere 5.5 (SYBEX) Paperback – 2014 by Scott Lowe, Nick Marshall, Forbes Guthrie , Matt Liebowitz , Josh Atwell - Wiley (2014) edition.
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A33538 – EDGE COMPUTING

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

1. Course Description

Course Overview

This course will explore research, frameworks, and applications in Edge Computing, with a focus on big data analytics. The class will begin with a review of current big data analytics frameworks for Cloud Computing. We will then explore frameworks for computing over edge devices and cloud. Finally, we will study algorithms for distributed data analytics over edge devices. The course content will come from research papers, articles, and software documentation. We will work together to develop a deep understanding of this content through class presentations and tutorials. Students will also create a research project of their choosing that leverages edge and cloud computing technologies.

Course Pre/Corequisites

2. Course Outcomes (COs)

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

A33538.1 Explore the need for new computing paradigms.

A33538.2 Explain major components of fog and edge computing architectures.

A33538.3 Identify potential technical challenges of the transition process and suggest solutions.

A33538.4 Analyze data and application requirements and pertaining issues.

A33538.5 Design and model infrastructures.

3. Course Syllabus

UNIT I

IoT and Edge Computing Definition and Use Cases , Introduction to Edge Computing Scenario's and Use cases - Edge computing purpose and definition, Edge computing use cases, Edge computing hardware architectures, Edge platforms, Edge vs Fog Computing, Communication Models - Edge, Fog and M2M.

UNIT II

IoT Architecture and Core IoT UNITs-A connected ecosystem, IoT versus machine-to-machine versus, SCADA, The value of a network and Metcalfe's and Beckstrom's laws, IoT and edge architecture, Role of an architect, Understanding Implementations with examples-Example use case and deployment, Case study – Telemedicine palliative care, Requirements, Implementation, Use case retrospective.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT III

Raspberry Pi: Introduction to Raspberry Pi, About the Raspberry Pi Board: Hardware Layout and Pinouts, Operating Systems on Raspberry Pi, Configuring Raspberry Pi, Programming Raspberry Pi, Connecting Raspberry Pi via SSH, Remote access tools, Interfacing DHT Sensor with Pi, Pi as Webserver, Pi Camera, Image & Video Processing using Pi.

UNIT IV

Implementation of Microcomputer Raspberry Pi and device Interfacing, Edge to Cloud Protocols, MQTT, and MQTT publish-subscribe, MQTT architecture details, MQTT state transitions, MQTT packet structure, MQTT data types, MQTT communication formats, MQTT 3.1.1 working example.

UNIT V

Edge computing with Raspberry Pi, Industrial and Commercial IoT and Edge, Edge computing and solutions.

4. Text Books & References

TEXT BOOKS

1. IoT and Edge Computing for Architects - Second Edition, by Perry Lea, Publisher: Packet Publishing, 2020, ISBN: 9781839214806
2. Raspberry Pi Cookbook, 3rd Edition, by Simon Monk, Publisher: O'Reilly Media, Inc., 2019, ISBN: 978149204322.

REFERENCES

1. Fog and Edge Computing: Principles and Paradigms by RajkumarBuyya, Satish Narayana Srirama, wiley publication, 2019, ISBN: 9781119524984.
 2. David Jensen, "Beginning Azure IoT Edge Computing: Extending the Cloud to the Intelligent Edge, MICROSOFT AZURE
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A33540- 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	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of essential concepts of blockchain technology. To familiarize students with Bitcoin protocol followed by the Ethereum protocol – to lay the foundation necessary for developing applications and programming. Students should be able to learn about different types of blockchain and consensus algorithms

2. Course Outcomes (COs)

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

A33540.1: To explain the basic notion of distributed systems.

A33540.2: To use the working of an immutable distributed ledger and trust model that defines blockchain.

A33540.3: To illustrate the essential components of a blockchain platform.

3. Course Syllabus

UNIT-1

Basics: The Double-Spend Problem, Byzantine Generals' Computing Problems, Public-Key Cryptography, Hashing, Distributed Systems, Distributed Consensus.

UNIT-2

Technology Stack: Blockchain, Protocol, Currency.

Bitcoin Blockchain: Structure, Operations, Features, Consensus Model, Incentive Model.

UNIT-3

Ethereum Blockchain: Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model.

UNIT-4

Tiers of Blockchain Technology: Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types of Blockchain: Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains.

UNIT-5

Types of Consensus Algorithms: Proof of Stake, Proof of Work, Delegated Proof of Stake, Proof Elapsed Time, Deposit-Based Consensus, Proof of Importance, Federated Consensus or Federated Byzantine Consensus, Practical Byzantine Fault Tolerance. Blockchain Use Case: Supply Chain Management.

4. Books and Materials

Text Books

1. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley & Sons.
 2. Anshul Kaushik, Block Chain & Crypto Currencies, Khanna Publishing House.
-

3. Building Blockchain Projects, Narayan Prusty, Packt Publishing.

References

1. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Imran Bashir, Packt Publishing (March 17, 2017).
2. Blockchain: Blueprint for a New Economy by Melanie Swan, Shroff Publisher publisher/O'Reilly Publisher Media; 1st edition (2015).

Online Resources:

1. <https://nptel.ac.in/courses/106105184/>
 2. <https://www.coursera.org/learn/blockchain-platforms>.
 3. Introduction to Blockchain Technology and Applications,
 4. https://swayam.gov.in/nd1_noc20_cs01/preview.
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A33543 – EMBEDDED SYSTEMS

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

3. Course Description

Course Overview

This course provides an introduction to embedded systems and their architecture considerations. Focus is on MSP430 microcontroller which includes internal architecture, instruction set, register organization, addressing modes, on-chip peripherals, data communication protocols and embedded C programming. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course will be useful to students as a first level course for embedded systems.

Course Pre/Corequisites

A33501 – Foundations for IoT

4. Course Outcomes (COs)

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

A33543.1 Analyze MSP430 Microcontroller Architectures

A33543.2 Develop Programs MSP430 Microcontroller

A33543.3 Make use of Peripherals of MSP430 to interface I/O Devices

A33543.4 Apply Serial Communication Protocols for interfacing serial Devices.

A33543.5 Design Embedded Applications using MSP430 Controller

3. Course Syllabus

INTRODUCTION TO EMBEDDED SYSTEMS: Embedded System Introduction, Host And Target Concept, Embedded Applications, Features Considerations For Embedded Systems- ROM, RAM, Timers, Data and Address Bus Concept, CISC Vs RISC, Von-Neumann Vs Harvard Architecture, C Vs Embedded C, Memory Types.

MSP430 MICROCONTROLLER: Low power RISC MSP430 Features, MSP430G2x53–block diagram, Memory map, Register set, Addressing modes, Instruction set, on-chip peripherals (analog and digital).

MSP430 PERIPHERALS: GPIO Features, I/O Port registers and pull up/down resistors concepts, Interrupts, Watchdog timer, System clocks, Low power modes, Timers, PWM concept, ADC and Comparator.

MSP430 PROGRAMMING IN C: LED interface, Switch interface, LDR sensor interface, PWM generation, Potentiometer interface, LCD interface.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

MSP430 SERIAL COMMUNICATION: Serial communication basics, Synchronous/Asynchronous interfaces. UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI using MSP430.

4. Books and Materials

Text Book(s)

- 2) John H. Davies. *MSP430 microcontroller basics*, 1st Edition, Newnes Publication, 2008

Reference Book(s)

- 1) Miroslav Cina. *MSP430 MicrocontrollerEssentials*, 1st Edition, Elektor Publication, 2022

Online Learning Resources:

- 2) <https://www.xanthium.in/brief-introduction-msp430g2xxx-using-ti-launchpad-development-board>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33544– INTRODUCTION TO INDUSTRY 4.0 AND IIOT

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

5. Course Description

Course Overview

This course provides an introduction to Industry 4.0, phases of development, its applications, and technologies. Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies, it also provides an introduction to Industrial Internet of Things (IIoT), comparison between industry 4.0 and IIoT, business models of IoT and IIoT. The IIoT is an application of IoT in industries to modify the various existing industrial systems.

Course Pre/Corequisites

Internet of Things

6. Course Outcomes (COs)

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

A33544.1 Understand the various stages of the industrial revolution.

A33544.2 Analyze the applications of Industry 4.0 technologies in industrial settings.

A33544.3 Distinguish Industry 4.0 and IIoT as well as IoT and IIoT in terms of their features.

A33544.4 Evaluate the feasibility and appropriateness of different business models for IIoT.

A33544.5 Compare and contrast the various industrial data transmission technologies.

3. Course Syllabus

OVERVIEW OF INDUSTRY 4.0: Introduction, Industrial revolution – Phases of development, Evolution of Industry 4.0, Industry 4.0 vs Traditional Automation, Environmental impacts of industrial revolution, Industrial Internet, Applications of Industry 4.0.

INDUSTRY 4.0 TECHNOLOGIES: Introduction, Augmented Reality and Virtual Reality, Artificial Intelligence, Big Data and Advanced Analytics

OVERVIEW OF IIOT: Introduction, Prerequisites of IIoT, Industrial Internet Systems, Industrial sensing, Industrial Processes, Industry 4.0 vs IIoT, IoT vs IIoT

BUSINESS MODELS: Introduction, definition, Business Models of IoT and IIoT, Business opportunities in IIoT, Categorization of business models in IIoT

INDUSTRIAL DATA TRANSMISSION: Features and Components – Foundation Fieldbus, Profibus, Interbus, Modbus, Bitbus, Controller Area Network, Wireless HART, LoRa and LoRaWAN

4. Books and Materials

Text Book(s)

- 1) 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://onlinecourses.nptel.ac.in/noc23_cs82/preview
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A33545- QUANTUM COMPUTING

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

1. Course Description

Course Overview:

This course provide the students with knowledge of building blocks of Quantum computers and highlight the paradigm change, between conventional computing and quantum computing, Quantum state transformations and the algorithms, entangled quantum subsystems and properties of entangled states. Explore the applications of quantum computing

2. Course Outcomes (COs)

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

A33545.1. Understand the basic principles of quantum computing.

A33545.2. Gain knowledge of the fundamental differences between conventional computing and quantum computing.

A33545.3. Understand several basic quantum computing algorithms.

A33545.4. Understand the classes of problems that can be expected to be solved well by quantum computers.

A33545.5. Simulate and analyze the characteristics of Quantum Computing Systems.

3. Course Syllabus

UNIT I QUANTUM BUILDING BLOCKS

The Quantum Mechanics of Photon Polarization, Single-Qubit Quantum Systems, Quantum State Spaces, Entangled States, Multiple-Qubit Systems, Measurement of Multiple-Qubit States, EPR Paradox and Bell's Theorem, Bloch sphere

UNIT II QUANTUM STATE TRANSFORMATIONS

Unitary Transformations, Quantum Gates, Unitary Transformations as Quantum Circuits, Reversible Classical Computations to Quantum Computations, Language for Quantum Implementations.

UNIT III QUANTUM ALGORITHMS

Computing with Superpositions, Quantum Subroutines, Quantum Fourier Transformations, Shor's Algorithm and Generalizations, Grover's Algorithm and Generalizations

UNIT IV ENTANGLED SUBSYSTEMS AND ROBUST QUANTUM COMPUTATION

Quantum Subsystems, Properties of Entangled States, Quantum Error Correction, Graph states and codes, CSS Codes, Stabilizer Codes, Fault Tolerance and Robust Quantum Computing

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT V QUANTUM INFORMATION PROCESSING

Limitations of Quantum Computing, Alternatives to the Circuit Model of Quantum Computation, Quantum Protocols, Building Quantum, Computers, Simulating Quantum Systems, Bell states. Quantum teleportation. Quantum Cryptography, no cloning theorem

4. Books and Materials

Text Books:

1. Parag K Lala, Mc Graw Hill Education, Quantum Computing, A Beginners Introduction, First edition (1 November 2020).
2. Michael A. Nielsen, Issac L. Chuang, Quantum Computation and Quantum Information, Tenth Edition, Cambridge University Press, 2010.
3. Chris Bernhardt, The MIT Press; Reprint edition (8 September 2020), Quantum Computing for Everyone.

REFERENCES:

1. John Gribbin, Computing with Quantum Cats: From Colossus to Qubits, 2021
 2. William (Chuck) Easttom, Quantum Computing Fundamentals, 2021
 3. Parag Lala, Quantum Computing, 2019
 4. Eleanor Rieffel and Wolfgang Polak, QUANTUM COMPUTING A Gentle Introduction, 2011
 5. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press.2002
 6. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, World Scientific. 2004
 7. Pittenger A. O., An Introduction to Quantum Computing Algorithms 2000
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A33541 – IOT VISUAL PROGRAMMING

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

1. Course Description

Course Overview

This course provides an introduction to IoT visual programming of node-red and labview. Focus is on node-red programming, labview programming with sensors and actuators interfacing. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course has simple examples with integration of techniques turned into an application.

Course Pre/Corequisites

Raspberry Pi, Arduino, ESP32 and Any Programming Language

2. Course Outcomes (COs)

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

A33541.1Program the Raspberry pi using node-red.

A33541.2Design User Interfaces using node-red and labview

A33541.3Apply labview linx concepts for programming of Arduino.

A33541.4Monitor and Control I/O devices via firebase using labview and ESP32.

A33541.5Develop IoT applications using node-red and labview.

3. Course Syllabus

INTRODUCTION TO NODE-RED: Node-Red introduction, Installation on Windows and Raspberry Pi, Node-RED Concepts, Understanding Node-RED editor, creating first flow, installation of dashboard palette, creating first dashboard.

IoT WITH NODE-RED: Core Nodes – Inject, Debug, Function, Change, Switch, Template, MQTT introduction, MQTT basic working, benefits of MQTT, MQTT Nodes – IN and OUT, using Node-RED and Raspberry Pi– Controlling LED and Read DHT sensor via MQTT broker

INTRODUCTION TO LABVIEW: Labview Introduction, Installation, Data Flow Programming, Labview environment, Labview Palettes, Debugging techniques, creating first Labview VI program, Data types- Numeric, Boolean, String, Enum, Arrays. Labview Functions – Numeric, Boolean, Comparison, Structures and Loops.

ARDUINO UNO WITH LABVIEW: Installation of arduino uno linx package, linx functions – open serial, digital read and write, pwm, close serial, LED on/off and brightness control, push button interface, potentiometer interface.

IoT WITH LABVIEW:HTTP Introduction, HTTP Client functions – Open handle, Get, Put, Close handle, *Controlling LED via Firebase* – Hardware and Software requirements, Creating Labview VI, Writing the

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

ESP32 sketch, *Reading a Potentiometer via Firebase* – Hardware and Software requirements, Creating Labview VI, Writing the ESP32 sketch.

4. Books and Materials

Text Book(s)

1. Taiji Hagino. *Practical Node-RED Programming*, 1st Edition, Packt Publication, March 2021
2. Marco Schwartz, Oliver Manickum. *Programming Arduino with LabVIEW*, 1st Edition, Packt Publication, January 2025

Online Learning Resources:

1. <https://nodered.org/docs/user-guide/>
 2. <https://learn.ni.com/learn/article/labview-tutorial>
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A30081 – RESEARCH METHODOLOGY

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

1. Course Description

Course Overview

The primary objective of this course is to have a general understanding of statistics as applicable to business and its use in areas of engineering research. The Course addresses the methods of research with an emphasis on various stages that are necessary to obtain and process information to enable well informed decision-making. It allows the students to grasp and comprehend the methods and techniques used in research and provide with the knowledge and skill to undertake research.

Course Pre/Corequisites

The course has no specific prerequisite and Corequisites

2. Course Outcomes (COs)

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

- A30081.1 Interpret the importance of literature survey to identify the research problem.
- A30081.2 Develop suitable research methodologies to conduct engineering research.
- A30081.3 Apply the principles of research to gather the required data from various sources.
- A30081.4 Evaluate the gathered data by using appropriate statistical techniques.
- A30081.5 Prepare and present the research report effectively with the help of visual aids.

3. Course Syllabus

UNIT-I

Research Methodology: Objectives and motivation of research, types of research, research approaches, significance of research, research methods verses methodology, research and scientific method, important of research methodology, research process, criteria of good research, problems encountered by researchers in India, benefits to the society in general, defining the research problem: definition of research problem, problem formulation, necessity of defining the problem, technique involved in defining a problem.

UNIT-II

Literature Survey: Importance of literature survey, sources of information, assessment of quality of journals and articles, information through internet. Literature review: need of review, guidelines for review, record of research review.

UNIT-III

Research Design: Meaning of research design, need of research design, feature of a good design important concepts related to research design, different research designs, basic principles of experimental design, developing a research plan, design of experimental set-up, use of standards and codes.

UNIT-IV

Data Collection: Collection of primary data, secondary data, data organization, methods of data grouping, diagrammatic representation of data, graphic representation of data. Sample designed for sampling, some important sampling definitions, estimation of population, role of statistics for data analysis, parametric v/s non-parametric methods, and descriptive statistics, measures of central tendency and

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

dispersion, hypothesis testing, use of statistical software. Data analysis: deterministic and random data, uncertainty analysis, tests for significance: chi-square, student's t-test, regression modelling, direct and interaction effects, a nova, F-test, time series analysis, autocorrelation and autoregressive modelling.

UNIT-V

Research Report Writing: Format of the research report, synopsis, dissertation, and thesis its differentiation, references/bibliography/webliography, technical paper writing/journal report writing, making presentation, use of visual aids. Research proposal preparation: writing a research proposal and research report, writing research grant proposal.

4. Books and Materials

Text Book(s)

1. O.R Krishnaswami and M. Ranganatham, Methodology of Research in Social Sciences, Mumbai: Himalaya Publishing House, ISBN 81-8318-454-5, 2005.

Reference Book(s)

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30087 – ENTREPRENEURSHIP DEVELOPMENT

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

1. Course Description

Course Overview

The primary objective of this course is to provide common knowledge on the basics of entrepreneurship, risk and reward. Further, the course addresses on promotion and institutional support by various institutions, ways and means of project planning, feasibility studies, project proposal and report preparation and, also the role of angel investors in promotion and expansion of start-ups in India. It also encourages the student to take up local challenges and establish startups. Hence, students will be able to transform himself/herself from a job seeker to provider.

Course Pre/Corequisites

The course has no specific prerequisite and Corequisites

2. Course Outcomes (COs)

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

A30087.1 Understand the foundation knowledge about entrepreneurship and importance of innovation and IPR in Entrepreneurship

A30087.2 Aware about the important stakeholders in entrepreneurship support ecosystem and Govt. initiatives related to Entrepreneurship

A30087.3 Develop the Business Plan Proposals and assess the business ideas

A30087.4 Identify the suitable sector for starting entrepreneurial venture as per their competencies

.

3. Course Syllabus

UNIT-I

Introduction to Entrepreneurship: Entrepreneurship – Definitions, Evolution and Concept of Entrepreneur, Scope of Entrepreneurship, Entrepreneurial Characteristics and Skills, Types of Entrepreneurs, Distinction between Entrepreneur and Manager, Functions of an Entrepreneur, Success Factors for Entrepreneurs

UNIT-II

Innovation and IPR for Entrepreneurship: Creativity and Invention, Innovation – Definitions, Types of Innovation, Design Thinking, Elements in the Innovation Process, Barriers for Innovation, IPR – Meaning and Definitions, Importance of IPR, Types of IPR – Patents, Copyrights, Trademarks, Trade Secrets, Geographical Indications

UNIT-III

Entrepreneurial Support Ecosystem: Business Incubators, Accelerators, Venture Capitalists, Angel Investors, Impact Investors, Government Schemes and Programs for Entrepreneurship Development – Startup India & Standup India, Atal Innovation Mission, DST – NIDHI, DBT – BIRAC, Pradhan Mantri Mudhra Yojna, MSME Schemes

UNIT-IV

Planning for Entrepreneurial Venture: Business Plan – Meaning and Definition, Uses of Business Plan, Writing a Business Plan, Entrepreneurial Marketing, Advertising, Branding, Financing, Legal Structures for Startup Registration, Business Model Canvas, Ethical Considerations in Entrepreneurship, Challenges of Entrepreneurs

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT-V

Sectoral Opportunities in Entrepreneurship: Technology Entrepreneurship, Social Entrepreneurship, Agriculture Entrepreneurship, Women Entrepreneurship, Rural Entrepreneurship, Eco-Entrepreneurship, Tourism Entrepreneurship & Case studies

4. Books and Materials

Text Books:

1. Rajeev Roy, Entrepreneurship, Second Edition, Oxford University Press, New Delhi, 2011
2. Dr. S.S. Khanka, Entrepreneurial Development, S. Chand & Company Ltd., New Delhi, 2010
3. David H. Holt, Entrepreneurship New Venture Creation, PHI Learning Private Limited, New Delhi, 2010

Reference Books:

1. Bruce R. Barringer & R. Duane Ireland, Entrepreneurship: Successfully Launching New Ventures, Pearson, New Delhi, 2006
2. Vasanth Desai, The Dynamics of Entrepreneurial Development and Management, Sixth Edition, Himalaya Publishing House, New Delhi, 2011

Online Learning Resources:

1. NPTEL: Entrepreneurship by Prof. C Bhaktavatsala Rao, IIT Madras
 2. SWYAM: Entrepreneurship Development by Dr. Nilam Panchal, B.K. School of Professional and Management Studies, Gujrat University
 3. Future Learn: Entrepreneurship: From Business Idea to Action by King's College, London
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A30022 - PROFESSIONAL ETHICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	40	60	100

1. Course Description

Course Overview

Ethical and professional values course provides a framework and a moral compass for students and help guide their professional behaviors. This course broadens ethical and professional values which underpin professional skills and behaviors. The students work efficiently by prioritizing, organizing and managing their time effectively. They make the best use of technology, including spreadsheets and data analytics, to find effective solutions to various issues by considering the importance of maintaining professional competence and pursuing life-long learning. This course also introduces them to communicate effectively in academics and in profession. The students become aware of the working structure of the society by identifying opportunities, problems and observe trends and make suitable recommendations based on them. The students explore different types of leadership approaches and qualities of effective 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 – Universal Human Values- understanding harmony

2. Course Outcomes (COs)

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

- A30022.1 to identify ethical dilemmas and take ethical decisions.
- A30022.2 to consider the importance of maintaining professional competence and pursuing life-long learning
- A30022.3 to understand patterns and channels of communication and their efficiency.
- A30022.4 to analyze and evaluate available data and information from a variety of sources.
- A30022.5 to demonstrate leadership qualities in teams effectively and efficiently.
- A30022.6 the importance of applying an enquiring mind when collecting and assessing data and information.

3. Course Syllabus

UNIT I ETHICS AND PROFESSIONALISM

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

UNIT II PERSONAL EFFECTIVENESS

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Prioritising, organising and managing time effectively, Using technology effectively- Using email effectively How to manage email, Maintaining professional competence and lifelong 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 COMMUNICATION AND INTERPERSONAL SKILLS

Introduction, The communication process- What can go wrong?, Barriers and distortions to the communications process, How good are you at communicating? Formal and informal communication, Six elements of effective communication, Communicating in the workplace- Errors and Solutions, Report Writing- the purpose of and the best practices in report writing. Interpersonal skills- Interpersonal skills, Personal qualities, Verbal communication Non-verbal communication

UNIT IV SOCIAL AWARENESS

How to enhance your commercial awareness, SWOT analysis, deciding when to seek the help of experts Suitability, acceptability, feasibility (SAF) model

UNIT V LEADERSHIP AND TEAM WORKING

Introduction, The nature of leadership, Situational leadership, Leadership in action, Action-centered leadership (Adair), Factors influencing leadership style, Blake and Mouton grid, Examples of outstanding leaders, Team development, Motivation, Accountability, responsibility and authority.

4. Books and Materials

Text Book(s)

1. Rizvi, M. Ashraf, *Effective Technical Communication*, Noida, McGraw-Hill Education. 2009.
2. Engineering Ethics (Includes Human Values)" by Govindarajan M

Reference Book(s)

1. Professional Ethics in Engineering" by I A Dhotre V S Bagad
 2. Professional Ethics In Engineering" by Dr V Jayakumar and Lakshmi Publications
 3. Engineering Ethics: Challenges and Opportunities" by W Richard Bowen
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30281 – FUNDAMENTALS OF ELECTRICAL ENGINEERING

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

1. Course Description

Course Overview

This course is to familiarize the students about the basics of electrical engineering, circuit theory and electrical machines. This course introduces the fundamental concepts, basic knowledge of electrical quantities, network theorems for the analysis of basic DC and AC circuits. It also deals with the working principle, construction and operation of DC machines and AC machines. These machines are used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A30281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A30281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.

A30281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A30281.4 Test the Performance of DC machines, AC machines and single-phase transformers.

3. Course Syllabus

UNIT-I

DC Circuits: Circuit concept, types of network elements, ohm's law, types of sources voltage -

current relationship for passive element (R, L & C), Kirchhoff's laws, network reduction techniques: series, parallel, combination of series and parallel, delta - star transformation, loop and nodal analysis. Network Theorems: Thevenin's, Norton's, superposition and maximum power transfer theorems (DC excitation only).

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT-II

AC Circuits: Representation of alternating quantities, peak, average, RMS, form factor and peak factor for sinusoidal wave form. J-notation, Analysis of single-phase AC circuits consisting of pure R, L & C circuits, combination of RL, RC and RLC (only series) circuits.

UNIT-III

D.C Generators: Constructional details of D.C. generator, principle of operation of D.C.

generators, types of D.C generators, E.M.F equation. D.C Motors: Principle of operation of DC motors, back emf, torque equation, Swinburne's test, speed control of DC motors by armature and field control methods.

UNIT-IV

1-phase Transformers: Principle of operation, constructional details, E.M.F. equation, losses and efficiency, OC and SC tests.

UNIT-V

3-Phase Induction Motors: Principle of operation, types of induction motors, slip, torque equation, torque-slip characteristics. 3-phase Alternators: Principle of operation - constructional details-EMF equation.

4. Books and Materials

Text Book(s)

1. V.K. Mehta and Rohith Mehta, Basic electrical engineering, S. Chand publishers, 14th edition.
2. M.S. Naidu and S. Kamakshaiah, Introduction to Electrical Engineering, Tata McGraw Hill Publishers, 1st edition, 2004.

Reference Book(s)

1. A Sudhakar, Shyammohan S Palli, Circuits and Networks, Tata McGraw-Hill, 4th edition.
 2. D. C. Kulshreshtha, Basic Electrical Engineering, McGraw Hill, 2009.
 3. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A30382 – MECHANICAL TECHNOLOGY

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

1. Course Description

Course Overview

This course provides knowledge to select the required material for different engineering applications. It also deals with basic concepts of internal combustion engines, compressors, power transmission systems and welding processes. The student will be able to apply the knowledge of engines, materials and welding processes which can be used in domestic and industrial applications.

Course Pre/Corequisites

The course has no specific prerequisite and Corequisites

2. Course Outcomes (COs)

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

A30382.1 Identify the types of engines and their cycles.

A30382.2 Classify the reciprocating air compressors and their working principles.

A30382.3 Discuss the constructional features of domestic refrigeration and air conditioning systems.

A30382.4 Inspect the mechanism of power transmission elements of various engineering systems.

A30382.5 Select suitable engineering materials and welding methods for real time applications.

3. Course Syllabus

UNIT I

I.C. Engines: working principle, 4 stroke and 2 stroke engines, comparison.

UNIT II

Reciprocating Air compressors: Description and working of single stage and multistage reciprocating air compressors – inter cooling.

UNIT III

Refrigeration systems: Study of household refrigerator, window air conditioner, split air conditioner ratings and selection criteria of above devices

UNIT IV

Transmission of power: Belt, Rope, Chain and gear drive.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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 A30085 – DESIGN THINKING

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

1. Course Description

Course Overview

This course introduces design thinking and its application to developing new products, services, and the organization of businesses. Design thinking is a human-centric, interdisciplinary approach towards innovation. Design thinking as practiced in this course blends creative thinking and logical or rational thinking, and involves a process consisting of empathizing, ideating, and prototyping. Students will learn design principles, methodologies, and frameworks, and apply them through exercises and projects. The course is divided into four main aspects, all interconnected but which we also separately emphasize. They are: (1) design methodologies, (2) the “thing” to be designed (i.e., products, services, or the business itself, e.g. the business model), (3) human attitudes and behaviours (towards the designs), and (4) design contexts.

Course Pre/Corequisites

This course has no specific prerequisite and Corequisites

2. Course Outcomes (COs)

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

A30085.1 Appreciate various design processes for creativity and innovation.

A30085.2 Develop design ideas through different techniques.

A30085.3 Identify the significance of reverse engineering about products.

A30085.4 Make use of design drawings to communicate ideas effectively.

A30085.5 Build organizations that support creative and innovative thinking.

3. Course Syllabus

UNIT-I

Introduction to design thinking, definition, why is design thinking important, how is design thinking different, process of design - introduction – product life cycle - design ethics, creativity, innovation and design, design process - creativity and innovation in design process - design limitation, preparing mind for innovation-the physics of innovation.

UNIT-II

Idea generation- The idea, generation process, mind mapping tool. Experimentation-What works, learning launch tool, strategic opportunities, creative people, creative organizations, ideas, and tools to help both people and organizations work more creatively.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

UNIT-III

Creative thinking - generating design ideas - lateral thinking – analogies – brainstorming - mind mapping - national group technique – synectic's - development of work - analytical thinking -group activities recommended.

UNIT-IV

Reverse engineering - introduction - reverse engineering leads to new understanding about products - reasons for reverse engineering - reverse engineering process - step by step – case study.

UNIT-V

Basics of drawing to develop design ideas- introduction - many uses of drawing - communication through drawing – drawing basis – line - shape/ form – value – colour – texture –overview of drawing -practice using auto cad recommended.

4. Books and Materials

Text Book(s)

1. John.R.Karsnitz, Stephen O 'Brien and John P. Hutchinson, Engineering Design, Cengage learning (International edition) Second Edition, 2013.
2. Yousef Haikand Tamer M. Shahin, Engineering Design Process, Cengage Learning, Second Edition, 2011.

Reference Online Resources

1. https://courses.edx.org/register?course_id=coursev1%3AUQx%2BCORPINN1x%2B2T2020&enrollment_action=enroll&email_opt_in=false
2. https://www.coursera.org/programs/coursera-response-program-for-pcekbrrt?collectionId=&productId=bfqQqUbbEeeMtBKozo_2UA&productType=coure&showMiniModal=true
3. www.tutor2u.net/business/presentations/.../productlifecycle/default.html or <https://www.mindtools.com/brainstm.html>
4. <https://www.quicksprout.com/.../how-to-reverse-engineer-your-competitor>
www.vertabelo.com/blog/documentation/reverseengineering<https://support.microsoft.com/en-us/kb/273814>
5. <https://support.google.com/docs/answer/179740?hl=en><https://www.youtube.com/watch?v=2mjSDlBaUIM>thevirtualinstructor.com/for-eshortening.html
6. https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdfwww.bizfilings.com›Home ›Marketing› Product Development
7. <https://canvas.uw.edu/courses/1023376/assignments/syllabus>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A30381 – OPTIMIZATION TECHNIQUES

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

1. Course Description

Course Overview

This course deals with modelling and optimization of the problems with limited resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

Course Pre/Corequisites

The course has no specific prerequisite and Corequisites

2. Course Outcomes (COs)

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

A30381.1 Apply various Operations Research models and methods to real world problems.

A30381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A30381.3 Evaluate various alternatives available to find optimal solution for real world problems.

A30381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A30381.5 Decide the best operating policy for the efficient use of resources.

3. Course Syllabus

UNIT I

Operations Research: Scope, O.R models, Linear Programming - Formulation, graphical method, simplex method, big -M method and special cases.

UNIT II

Assignment Model: Formulation, optimal solution by Hungarian method, maximization problem, balanced and unbalanced problems, restriction models. Sequencing Models: Introduction, Johnson's Rule, processing n jobs through two machines, processing n jobs through three machines and processing n jobs through m machines.

UNIT III

Transportation Problem: Introduction, finding initial basic feasible solutions, optimality test, alternate solutions and unbalanced transportation problem.

UNIT IV

Game Theory: Introduction, minimax (maximin) method of optimal strategies, saddle point, value of the game, rectangular games without saddle point, dominance principle, graphical method. Queuing Theory: Introduction, terminology, single channel models with finite queue length and non-finite queue length.

UNIT V

Introduction to Project Management: Terminology, methods of finding critical path -critical path method (CPM), project evaluation and review technique (PERT) - probability of completing the project within scheduled time and crashing.

4. Books and Materials

Text Book(s)

1. S.D. Sharma, Operations Research, New Delhi: Kedarnath Publications, 2017
2. S.R. Yadav and A.K. Malik, Operations Research, New Delhi: Oxford University Press, 2014.

Reference Book(s)

1. Hamdy Abdelaziz Taha, Operations Research: an Introduction, 9th edition, Pearson, Boston, 2015.
 2. Prem Kumar Gupta & D S Hira, Operations Research, Revised edition, New Delhi: S. Chand Publishing, 2015
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE A30484 – INTRODUCTION TO EMBEDDED SYSTEMS

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

1. Course Description

Course Overview

This course provides an introduction to embedded systems and their architecture considerations. Focus is on TM4C123GH6PM microcontroller which includes internal architecture, instruction set, register organization, addressing modes, on-chip peripherals and data communication protocols. This course will be useful to students as a first level course for embedded systems.

Course Pre/Corequisites

A30432 - Microprocessors and Microcontrollers

2. Course Outcomes (COs)

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

A30484.1 Analyze the embedded systems features and architecture considerations

A30484.2 Develop Programs using TM4C123GH6PM Microcontroller

A30484.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices

A30484.4 Apply Serial Communication Protocols for interfacing serial Devices.

A30484.5 Design Embedded Applications using TM4C123GH6PM Controller

3. Course Syllabus

UNIT - I

INTRODUCTION TO EMBEDDED SYSTEMS: Embedded System Introduction, Host and Target Concept, Embedded Applications, Features and Architecture Considerations for Embedded Systems- ROM, RAM, Timers, Data and Address Bus Concept, CISC vs RISC Design Philosophy, Von-Neumann Vs Harvard Architecture, Memory Types, Overview of Design Process of Embedded Systems, Programming Languages and Tools for Embedded Design.

UNIT - II

EMBEDDED CONTROLLER ARCHITECTURE: TM4C123GH6PM Block Diagram, Address Space, On-Chip Peripherals (Analog and Digital), Register Sets, Addressing Modes and Instruction Set Basics.

UNIT - III

OVERVIEW OF TM4C123GH6PM: I/O Pin Multiplexing, Pull Up/Down Registers, GPIO Control, Programming System Registers, Watchdog Timer, Need of Low Power for Embedded Systems, System Clocks and Control, Hibernation Module on TM4C, Active Vs Standby Current Consumption. Introduction to Interrupts, Interrupt Vector Table, Interrupt Programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

UNIT - IV

TOOLS OF EMBEDDED SYSTEMS: Embedded Hardware and Various Building Blocks, Processor Selection for an Embedded System, I/O Devices and I/O Interfacing Concepts, Timer and Counting Devices, Design

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Cycle in the Development Phase for an Embedded System, Uses of In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System, Design Metrics of Embedded Systems – Low Power, High Performance, Engineering Cost, Time-To-Market.

UNIT - V

EMBEDDED COMMUNICATIONS PROTOCOLS: Serial Communication Basics, Synchronous/Asynchronous Interfaces (Like UART, SPI, and I2C), Baud Rate Concepts, Implementing and Programming UART, SPI and I2C, SPI Interface Using TM4C. Case Study: Tiva Based Embedded System Application using the Interface Protocols for Communication with External Devices “Sensor Hub Booster Pack”.

4. Books and Materials

Text Book(s)

1. Raj Kamal. Embedded Systems, 2nd Edition, Tata McGraw-Hill Education, 2011.
2. Jonathan W Valvano. Introduction to ARM Cortex - M Microcontrollers, 5th Edition, and Create space Publications.

References

1. http://processors.wiki.ti.com/index.php/HandsOn_Training_for_TI_Embedded_Processors.
 2. http://processors.wiki.ti.com/index.php/MCU_Day_Internet_of_Things_2013_Workshop
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33550 – EMBEDDED C & VISUAL 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 laboratory course provides the students with the knowledge of embedded C programming and visual programming – GPIO ports, PWM, Potentiometer, Push button, LDR and DHT11 sensor using Code Composer Studio on MSP430 microcontroller, Node-RED on Raspberry Pi Arduino uno with Labview. This laboratory course helps to the students to use these experiments in Embedded Systems and IoT based projects.

Course Pre/Corequisites

Raspberry Pi, Arduino, ESP32 and Any Programming Language

2. Course Outcomes (COs)

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

A33550.1 Build Embedded C Programs using msp430 microcontroller.

A33550.2 Execute msp430 Programs using Code Composer Studio.

A33550.3 Design user interface using node-red and labview.

A33550.4 Test and Debug embedded c, node-red, labview Programs.

A33550.5 Develop embedded systems/IoT applications using msp430/node-red, labview.

3. Course Syllabus

PART A: List of Embedded C Programs using MSP430 Microcontroller

1. Interfacing and programming GPIO ports in C using MSP430 (blinking LEDs, push button interface).
2. PWM generation using Timer on MSP430 GPIO.
3. Interfacing potentiometer with MSP430.
4. PWM based Brightness Control of LED by potentiometer connected to MSP430 GPIO.
5. Serial Communication between PC and MSP430 microcontroller using UART.
6. Use LDR sensor to control an LED based on light using MSP430.

PART A: List of Node-RED and LabVIEW programs

1. Interfacing and programming GPIO ports of Raspberry Pi (control LEDs, push button interface) using Node-RED.
 2. Controlling LED on Raspberry Pi via MQTT broker using Node-RED dashboard.
 3. Read DHT11 on Raspberry Pi via MQTT broker using Node-RED dashboard.
 4. Interfacing and programming digital IO pins of Arduino uno (control LEDs, push button interface) using Labview.
-

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

5. Control brightness of LED & Read Potentiometer using Labview& Arduino uno.
6. Control LED and Read Potentiometer via Firebase using Labview and esp32.

4. Laboratory Equipment/Software/Tools Required

- 1) Computer systems installed with operating systems
- 2) Code Composer Studio Software
- 3) MSP430 G2 Launch Pad with USB Cable
- 4) Raspberry Pi, Arduino Uno, ESP32
- 5) Breadboards, Jumper wires
- 6) LEDs, Push Buttons, Potentiometers, Resistors, DHT11 sensor

5. Books and Materials

Reference Books

- 1) TaijiHagino. Practical Node-RED Programming, 1st Edition, Packt Publication, March 2021
- 2) Marco Schwartz, Oliver Manickum. Programming Arduino with LabVIEW, 1st Edition, Packt Publication, January 2025

Other References

- 1) <https://nodered.org/docs/user-guide/>
 - 2) <https://learn.ni.com/learn/article/labview-tutorial>
-