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 - R18

B.Tech Regular Four Year Degree Programme
(for the batches admitted from the academic year 2018- 2019)
&
B.Tech (Lateral Entry Scheme)
(for the batches admitted from the academic year 2019 - 2020)

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.

Betterment: Betterment is a way that contributes towards improvement of the students' grade in any course(s).
It can be done by either (a) re-appearing or (b) re-registering for the course.

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 Course: Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

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): MOOC courses inculcate the habit of self-learning. MOOC courses 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 - R18" and are binding on all the stakeholders.

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

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

Student 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 Anantapur (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 2018-19
&
For B.Tech Lateral Entry batches admitted from the academic year 2019 - 2020

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 176 credits and secures all 176 credits.

2. Students, who fail to fulfill 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

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
Practical	04	02
Mini Project/Internship	04	02
Technical Seminar	04	02
Project Work	04/16	02/08

5. Distribution and Weightage of Marks

5.1 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, Technical Seminar will be evaluated for 100

marks and Project work Phase-I shall be evaluated for a maximum of 100 internal marks and Project work Phase-II shall be evaluated for 200 marks whereas audit courses shall be evaluated for a maximum of 100 internal marks.

i. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
ii. For practical subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

5.2. Internal Examinations:

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

Subjective paper shall contain two parts –Part-A and Part-B. Part-A is compulsory and shall contain 12 questions each for 0.5 marks. Part-B shall contain 5 questions out of which the student needs to answer 3 questions each for 8 marks. The descriptive questions carrying 8 marks may contain either or questions also.

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

If the student is absent for the internal examination, no re-exam shall be conducted and internal marks for that examination shall be considered as zero.

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.

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.

5.3. End Examinations:

End examination of theory subjects shall have the following pattern:

There shall be 6 questions and all questions are compulsory. Question I shall contain 10 compulsory short answer questions for a total of 20 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 12, 12 and 11 marks.

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

5.4. For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the laboratory shall be evaluated for 30 marks by the concerned laboratory teacher based on the regularity/record/ viva. The end examination shall be conducted by the concerned laboratory teacher 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 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

5.5. There shall be an audit pass courses; one is Human Values & Professional Ethics and the other is Advanced English Language Communication skills course with no credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared pass in the audit course only when he/she secures 40% or more in the internal examinations. In case if student fails, re-exam shall be conducted for failed candidates every six months/semester at a convenient date of student satisfying the conditions mentioned in item 1 & 2 of the regulations.

5.6. For the subject having design and/or drawing, such as Engineering Drawing, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination.

Day-to-day work shall be evaluated for 10 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 30 marks with consideration of 80% weightage to the better mid exam and 20% to the other for the finalization of Internal marks. The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark. There shall be no objective paper in internal examination. 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.

5.7 There shall be two comprehensive online examinations, one at the end of II year and the other at the end of III year, with 100 objective questions for 100 marks on the subjects studied in the respective semesters. For each subject at least eight questions are to be framed. A student shall acquire 1 credit assigned to each of the comprehensive online examination when he/she secures 40% or more marks. In case, if a student fails in comprehensive online examination, he/she shall reappear/re-register by following a similar procedure adopted for the lab examinations.

5.8 There shall be a Discipline Centric Elective Course through **Massive Open Online Course (MOOC)** in VIII semester. The Head of the Department shall appoint one mentor for each of the MOOC subjects offered and the mentor appointed shall conduct the internal examinations following the guidelines. Further, the College shall conduct the external examination for the MOOC subject in line with other regular subjects (5.3) based on the syllabi of the respective subject provided in the curriculum.

5.9 There shall be an Open Elective/**Choice Based Credit Course (CBCC)** in V, VII and VIII semester, where in the students have to choose an elective offered by various departments including his/her own department.

5.10 **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. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects and a minor discipline project.

a. Students who have a CGPA 8.5 (for SC/ST students CGPA 8.0) or above (up to II year-I semester) and without any backlog subjects will be permitted to register for Minor discipline programme. An 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 from **third** year **first** semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor discipline registrations are not allowed in the **Fourth** year.

c. Students are not allowed to register and pursue more than two subjects in any semester. Students may register for minor discipline project from **third** year **first** semester onwards and may complete the same before **fourth** year **second** semester.

d. Each department enlisted a set of subjects from its curriculum which are core for the discipline without any prerequisites. The Evaluation pattern of theory subjects and minor discipline project work will be similar to the regular programme evaluation. The minor discipline project shall be evaluated by the committee consisting of Head of the Department along with the two senior faculty members of the department.

e. Students are not allowed to pursue minor discipline programme subjects under Self-study and/or MOOCs manner.

f. 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.

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

h. 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.

i. 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.

j. A Student registered for Minor in a discipline and 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.

k. 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 and a project taken for Minor programme with CGPA mentioned separately.

5.11 An **Internship/Mini Project** is introduced for 2 credits in the curriculum. The students need to take up the Internship during the break of end of VI Semester for a period of four weeks. The students who have not taken up the Internship may take up the Mini Project during the VII semester. The student who has taken up Internship shall submit a technical report along with internship certificate from the Internship organization in order to obtain the 2 credits. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising of Head of Department and 2 senior faculty. The evaluation of Mini Project shall be conducted at the end of the VII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department, two senior faculty members of the department and Supervisor), on the basis of project submitted by the student.

B. Tech **Civil Engineering** students need to take up the Mini project on Water Resource Engineering during the break of end of VI Semester for a period of four weeks for 2 credits. This shall be evaluated at the end of VII Semester by a committee consisting of Head of Civil Engineering Department along with two senior faculty members of the department.

5.12 There shall be a **Technical Seminar** presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his/her understanding about the topic and submit to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar shall be evaluated for 50 marks. A student shall acquire 2 credits assigned to the seminar when he/she secures 40% or more marks for the total of 50 marks. In case, if a student fails in seminar he/she shall reappear as and when IV/II supplementary examinations are conducted. The seminar shall be conducted

anytime during the semester as per the convenience of the department committee and students. There shall be no external examination for seminar.

5.13 The **Project Work** shall be evaluated in 2 phases. The Phase-1 of the Project Work shall start in IV-I. There shall be a presentation of Abstract of the main project in the VII Semester. After selecting the specific topic, the student shall collect the information and prepare a report, showing his/her understanding of the topic and submit the same to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. The evaluation of project work phase-I shall be conducted at the end of the VII semester on the internal evaluation basis for 100 marks. A student shall acquire 2 credits assigned, when he/she secures 40% or more marks for the total of 100 marks. There shall be no external evaluation for Project I. In case, if a student fails in Project I, re- examination shall be conducted within a month. In case if he/she fails in the re-examination also, he/she shall not be permitted to register for Project II. Further, such students shall reappear as and when VII semester supplementary examinations are conducted.

Procedure for Conduct and Evaluation of Project II:

Out of a total of 200 marks for the Project stage - II, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). The Viva-Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner. The evaluation of project work shall be conducted at the end of the VIII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department, two senior faculty members of the department and Supervisor), on the basis of two seminars given by each student on the topic of his/her project.

Further Civil Engineering Students need to carry out a survey camp during the break after IV Semester for a period of 2 weeks for 2 credits. The evaluation will be carried out in VIII Semester by the Departmental Committee consisting of head of Department and two senior faculty members.

6. Attendance Requirements:

- A student shall be eligible to appear for University examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a 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.
- 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 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 readmission for that semester when offered next.

7. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.**6**

7.1 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 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 audit courses and technical seminar & comprehensive viva – voce he/she should secure 40% of the total marks.

7.2 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 II year I 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 one supplementary examinations of I year (I & II Semesters).

One regular examination of II year I semester

7.3 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 III year I 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 year I Semester.
One regular and three supplementary examinations of I year II Semester.
One regular and two supplementary examinations of II year I Semester.
One regular and one supplementary examinations of II year II Semester.
One regular examination of III year I Semester.

And in case if student is detained for want of credits for particular academic year by sections 7.2 and 7.3 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 III Year or IV Year as the case may be.

7.4 A student shall register and put up minimum attendance in all 176 credits and earn all the 176 credits. Marks obtained in all 176 credits shall be considered for the calculation of aggregate percentage of marks obtained.

7.5 Students who fail to earn 176 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.

8. Course Pattern:

8.1 The entire course of study is for four academic years. All years shall be on semester pattern.

8.2 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 fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

8.3 **With–holding of Results**:

If any case of indiscipline or malpractice is pending against candidate, the result of the candidate shall be withheld 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.

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

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

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

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

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

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

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

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

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

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

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

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

10. 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 shall be placed in one of the following four classes

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

11. 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.

12. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment 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 re-joining 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.

13. Minimum Instruction Days:

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

14. Medium of Instruction

The Medium of Instruction is **English** for all courses, laboratories, internal and external examinations, Comprehensive Viva-Voce, seminar presentations and project reports.

15. 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 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

(x) 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

16. 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 writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
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	In case of students of the college, they

	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 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.	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.
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.(R15)
(LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2019-2020 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 fulfills 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 *134* credits and secures all *134* credits from II to IV year of Regular B. Tech. program.

(a) Students, who fail to fulfill the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.

(b) The regulations **3** to **6** 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.**6**

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 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 fulfills 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.

a. One regular and Two supplementary examinations of II year I semester.
b. One regular and one supplementary examinations of II year II semester.
c. One regular examination of III year I semester.

And in case if 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 IV year I 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 fulfillment 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 shall be placed in one of the following four classes:

First Class with Distinction	70% and above	From the aggregate marks secured for 134 Credits (i.e. II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

6. The regulations **11** to **16** 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

(An Autonomous Institute affiliated to JNTUA, Ananthapuramu)

NAAC Accreditation with 'A' Grade, Permanent Affiliation Status from JNTUA

Pasupula Village, Nandikotkur Road, Kurnool – 518002, Andhra Pradesh, India,

www.gpcet.ac.in

CURRICULUM FRAMEWORK

UG - BACHELOR OF TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING

Under R18 Regulations

B. Tech. - Regular Four-Year Degree Program

(For batches admitted from the Academic Year 2018 - 2019)

&

B. Tech. - Lateral Entry Scheme

(For batches admitted from the Academic Year 2019 - 2020)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

(An Autonomous Institute affiliated to JNTUA, Ananthapuramu)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

I SEMESTER (I YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1001	Functional English	HS	3	0	0	3	30	70	100
A1002	Mathematics – I	BS	3	0	0	3	30	70	100
A1501	Computer Programming	ES	3	0	0	3	30	70	100
A1004	Engineering Chemistry	BS	3	0	0	3	30	70	100
A1005	Environmental Studies	BS	3	0	0	3	30	70	100
A1006	English Language Communication Skills Laboratory	HS	0	0	4	2	30	70	100
A1010	Engineering Chemistry Laboratory	BS	0	0	4	2	30	70	100
A1502	Computer Programming Laboratory	ES	0	0	4	2	30	70	100
		TOTAL	15	00	12	21	240	560	800

II SEMESTER (I YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1008	English for Professional Communication	HS	3	0	0	3	30	70	100
A1009	Mathematics – II	BS	3	0	0	3	30	70	100
A1201	Network Analysis	ES	3	0	0	3	30	70	100
A1003	Engineering Physics	BS	3	0	0	3	30	70	100
A1301	Engineering Drawing	ES	0	0	6	3	30	70	100
A1202	Network Analysis Laboratory	ES	0	0	4	2	30	70	100
A1007	Engineering Physics Laboratory	BS	0	0	4	2	30	70	100
A1302	Engineering and IT Workshop	ES	0	0	4	2	30	70	100
		TOTAL	12	00	18	21	240	560	800

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

III SEMESTER (II YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1014	Linear Algebra and Complex Variables	BS	3	1	0	4	30	70	100
A1401	Electronic Devices and Circuits	PC	3	1	0	4	30	70	100
A1402	Digital Logic Design	PC	4	0	0	4	30	70	100
A1403	Signals and Systems	PC	3	1	0	4	30	70	100
A1404	Probability Theory and Stochastic Processes	PC	3	0	0	3	30	70	100
A1405	Electronic Devices and Circuits Laboratory	PC	0	0	3	1.5	30	70	100
A1406	Digital Logic Design Laboratory	PC	0	0	3	1.5	30	70	100
A1407	Basic Simulation Laboratory	PC	0	0	2	1	30	70	100
A1013	Verbal Ability and Logical Reasoning	HS	1	0	0	1	30	70	100
		TOTAL	17	03	08	24	270	630	900

IV SEMESTER (II YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1408	Electronic Circuit Analysis	PC	3	0	0	3	30	70	100
A1409	Analog Communication Systems	PC	4	0	0	4	30	70	100
A1410	Electromagnetics and Transmission Lines	PC	3	1	0	4	30	70	100
A1211	Control Systems	PC	3	1	0	4	30	70	100
A1216	Electrical Technology	ES	3	0	0	3	30	70	100
A1411	Electronic Circuit Analysis Laboratory	PC	0	0	3	1.5	30	70	100
A1412	Analog Communication Systems Laboratory	PC	0	0	3	1.5	30	70	100
A1217	Electrical Technology Laboratory	ES	0	0	2	1	30	70	100
A1012	Quantitative Aptitude	BS	1	0	0	1	30	70	100
A1413	Comprehensive Online Examination – I	PC	0	0	0	1	-	100	100
		TOTAL	17	02	08	24	270	730	1000

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PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

V SEMESTER (III YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1701	Managerial Economics and Financial Analysis	HS	3	0	0	3	30	70	100
A1418	Antennas and Wave Propagation	PC	3	0	0	3	30	70	100
A1419	Digital Communication Systems	PC	3	0	0	3	30	70	100
A1420	Linear Integrated Circuit Applications	PC	3	0	0	3	30	70	100
	Professional Elective – 1	PE	3	0	0	3	30	70	100
	Open Elective – 1	OE	3	0	0	3	30	70	100
A1421	Digital Design through Verilog HDL Laboratory	PC	0	0	4	2	30	70	100
A1422	Digital Communication Systems Laboratory	PC	0	0	3	1.5	30	70	100
A1423	Linear Integrated Circuit Applications Laboratory	PC	0	0	3	1.5	30	70	100
A1016	Advanced English Language Communication Skills	MC	2	0	0	0	100*	-	100*
		TOTAL	20	00	10	23	270	630	900

VI SEMESTER (III YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1425	Digital Signal Processing	PC	3	1	0	4	30	70	100
A1426	CMOS VLSI Design	PC	3	0	0	3	30	70	100
A1427	Microprocessors and Microcontrollers	PC	4	0	0	4	30	70	100
	Professional Elective – 2	PE	3	0	0	3	30	70	100
	Professional Elective – 3	PE	3	0	0	3	30	70	100
A1539	JAVA Programming Laboratory	PC	0	0	4	2	30	70	100
A1428	CMOS VLSI Design Laboratory	PC	0	0	3	1.5	30	70	100
A1429	Microprocessors and Microcontrollers Laboratory	PC	0	0	3	1.5	30	70	100
A1430	Comprehensive Online Examination – II	PC	0	0	0	1	-	100	100
A1015	Human Values and Professional Ethics	MC	2	0	0	0	100*	-	100*
		TOTAL	18	01	10	23	240	660	900

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

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PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

VII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1431	Embedded Systems	PC	3	0	0	3	30	70	100
A1432	Wireless Communication Systems	PC	3	0	0	3	30	70	100
A1433	Digital Image Processing	PC	4	0	0	4	30	70	100
	Professional Elective – 4	PE	3	0	0	3	30	70	100
	Open Elective – 2	OE	3	0	0	3	30	70	100
A1434	Embedded Systems Laboratory	PC	0	0	4	2	30	70	100
A1435	Signal and Image Processing Laboratory	PC	0	0	4	2	30	70	100
A1436	Mini-Project/Internship	PW	0	0	4	2	100	-	100
A1437	Project Work Phase – I	PW	0	0	4	2	100	-	100
		TOTAL	16	00	16	24	410	490	900

VIII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	MOOCs Course/ Professional Elective – 5	PE	3	0	0	3	30	70	100
	Open Elective – 3	OE	3	0	0	3	30	70	100
A1438	Technical Seminar	PC	0	0	4	2	100	-	100
A1439	Project Work Phase – II	PW	0	0	16	8	60	140	200
		TOTAL	06	00	20	16	220	280	500

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PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

Professional Electives

Professional Elective – 1	
Course Code	**Title of the Course**
A1451	Data Communications and Networking
A1452	Electronic Measurements and Instrumentation
A1453	Advanced Digital System Design
A1454	Internet of Things

Professional Elective – 2	
Course Code	**Title of the Course**
A1455	Microwave Engineering
A1456	Nanotechnology
A1457	System Verilog and Verification
A1458	Real Time Operating Systems

Professional Elective – 3	
Course Code	**Title of the Course**
A1459	Radar Engineering
A1460	Biomedical Signal Processing
A1461	FPGA Design
A1462	Embedded Hardware and Software Co-Design

Professional Elective – 4	
Course Code	**Title of the Course**
A1463	Cellular and Mobile Communications
A1464	Speech Processing
A1465	Low Power VLSI Design
A1466	Development of Secure Embedded Systems

Professional Elective – 5/MOOCs	
Course Code	**Title of the Course**
A1467	Satellite Communications
A1468	Pattern Recognition
A1469	Digital VLSI Testing
A1470	Embedded System Design

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PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A1181	Basic Civil Engineering	3-0-0	3	CE
A1182	Building Planning and Construction	3-0-0	3	CE
A1183	Disaster Management	3-0-0	3	CE
A1184	Water Resources Conservation	3-0-0	3	CE
A1281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A1282	Renewable Energy Sources	3-0-0	3	EEE
A1283	Electrical Measuring Instruments	3-0-0	3	EEE
A1381	Optimization Techniques	3-0-0	3	ME
A1382	Mechanical Technology	3-0-0	3	ME
A1383	Introduction to Automobile Systems	3-0-0	3	ME
A1481	Basic Electronics	3-0-0	3	ECE
A1482	Introduction to Communication Systems	3-0-0	3	ECE
A1483	Fundamentals of IoT	3-0-0	3	ECE
A1581	Basic Data Structures	3-0-0	3	CSE
A1582	Fundamentals of DBMS	3-0-0	3	CSE
A1583	Basics of Software Engineering	3-0-0	3	CSE
A1584	Python for Everyone	3-0-0	3	CSE
A1585	Computer Organization and Operating Systems	3-0-0	3	CSE
A1586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A1081	Management Science	3-0-0	3	H&S
A1082	Research Methodology	3-0-0	3	H&S
A1083	Intellectual Property Rights	3-0-0	3	H&S
A1084	National Service Scheme	3-0-0	3	H&S
A1085	Yoga	3-0-0	3	H&S
A1086	Design Thinking	3-0-0	3	H&S
A1087	Entrepreneurship Development	3-0-0	3	H&S

I B.Tech. I - Semester

	T	Tu	C
	3	1	3

(A1001) FUNCTIONAL ENGLISH
(Common to All Branches)

Preamble:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, and advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

Objectives:

- To enable the students to communicate in English for academic and social purpose.
- To enable the students to acquire structure and written expressions required for their profession.
- To develop the listening skills of the students.
- To inculcate the habit of reading and critical thinking skills.
- To enhance the study skills of the students with emphasis on LSRW skills.

UNIT –I

Topics: Paragraph writing, writing letters, role play, reading graphs, prepositions, designing posters, tenses, making recommendations.

Text: ENVIRONMENTAL CONSCIOUSNESS" from *MINDSCAPES*
Climate Change - Green Cover – Pollution

UNIT –II

Topics: Compound nouns, imperatives, writing instructions, interpreting charts and pictures, note making, role play, prefixes, subject-verb agreement.

Text: EMERGING TECHNOLOGIES from *MINDSCAPES*
Solar Thermal Power - Cloud Computing - Nanotechnology

UNIT –III

Topics: Making conversations, homonyms and homophones, SMS and use of emotions, past participle for irregular verbs, group discussion, E - mail communication, antonyms, Preparing projects

Text: GLOBAL ISSUES from *MINDSCAPES*
Child Labour - Food Crisis - Genetic Modification - E-Waste - Assistive Technology

UNIT –IV

Topics: Group discussion, affixes, double consonants, debates, writing a book / film review, predicting and problem-solving-future tense, adverbs

Text: SPACE TREK from *MINDSCAPES*
Hubble Telescope - Chandrayan-2 - Anusat - Living Quarters - Space Tourism

UNIT –V

Topics: Compare and contrast, effective writing, group discussion, writing reports, writing advertisements, tweeting and blogging, types of interviews, framing questions.

Text: MEDIA MATTERS from *MINDSCAPES*

History of Media - Language and Media - Milestone in Media - Manipulation by Media - Entertainment Media - Interviews

Text Books:

1. MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.

References:

1. A Practical Course in Effective English Speaking Skills by J.K.Gangal, PHI Publishers, New Delhi.2012
2. Technical Communication, Meenakshi Raman, Oxford University Press,2011.
3. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4Th edition.
4. Murphy"s English Grammar with CD, Murphy, Cambridge University Press,3 Rd edition.
5. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO,2008.

Outcomes:

- Have improved communication in listening, speaking, reading and writing skills in general.
- Have developed their oral communication and fluency in group discussions and interviews.
- Have improved awareness of English in science and technology context.
- Have achieved familiarity with a variety of technical reports.

I B.Tech. - I Semester

	T	Tu	C
	3	1	3

(A1002) MATHEMATICS – I
(Common to All Branches)

Objectives:

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations, Applications to first order equations; Orthogonal trajectories, Simple electric circuits.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x).

UNIT – II

Method of variation of parameters, linear equations with variable coefficients: Euler-Cauchy

Equations, Legendre‟s linear equation. Applications of linear differential equations-Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – III

Taylor‟s and Maclaurin‟s Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange‟s method of undetermined Multipliers with three variables only.

Radius of curvature.

UNIT – IV

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes in Cartesian and polar coordinates using double and triple integral.

UNIT – V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green‟s theorem – Stoke‟s and Gauss‟s Divergence Theorem (Without proof). Application of Green‟s, Stoke‟s and Gauss‟s Theorems.

Text Books:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

References:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Outcomes:

- The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.

- The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.

I B.Tech. I - Semester

T	Tu	C
3	1	3

(A1501) COMPUTER PROGRAMMING
(Common to All Branches)

Objectives:

- Understand problem solving techniques
- Understand representation of a solution to a problem
- Understand the syntax and semantics of C programming language
- Understand the significance of Control structures
- Learn the features of C language

UNIT - I

Overview of Computers and Programming - Electronic Computers Then and Now - Computer Hardware - Computer Software - Algorithm - Flowcharts - Software Development Method - Applying the Software Development Method.

Types, Operators and Expressions: Variable Names - Data Types and Sizes - Constants - Declarations - Arithmetic Operators - Relational and Logical Operators - Type Conversions - Increment and Decrement Operators - Bitwise Operators - Assignment Operators and Expressions - Conditional Expressions - Precedence and Order of Evaluation.

UNIT - II

Selections Statements – Iteration Statements – Jump Statements- Expression Statements - Block Statements.

Single Dimensional Arrays – Generating a Pointer to an Array – Passing Single Dimension Arrays to Functions – Strings – Two Dimensional Arrays – Indexing Pointers – Array Initialization – Variable Length Arrays

UNIT - III

Pointer Variables – Pointer Operators - Pointer Expressions – Pointers And Arrays – Multiple Indirection – Initializing Pointers – Pointers to Functions – C‟s Dynamic Allocation Functions – Problems with Pointers.

Understanding the scope of Functions – Scope Rules – Type Qualifiers – Storage Class Specifiers-Functions Arguments –The Return Statement.

UNIT - IV

Command line arguments – Recursion – Function Prototypes – Declaring Variable Length Parameter Lists

Structures – Arrays of Structures – Passing Structures to Functions – Structure Pointers – Arrays and Structures within Structures – Unions – Bit Fields – Enumerations – typedef

UNIT - V

Reading and Writing Characters – Reading and Writing Strings – Formatted Console I/O – Printf - Scanf – Standard C Vs Unix File I/O – Streams and Files – File System Basics – Fread and Fwrite – Fseek and Random Access I/O – Fprintf ( ) and Fscanf( ) – The Standard Streams – The Preprocessor Directives #define and #include.

Text Books:

1. "The Complete Reference C"- Fourth Edition- Herbert Schildt- McGrawHill Eduction.
2. "The C Programming Language" Second Edition- Brain W. Kernighan- Dennis M. Ritchie-Prentice Hall-India. (UNIT- I)

References:

1. Programming in C, Second Edition – Pradip Dey, Manas Ghosh, Oxford University Press.
2. "C From Theory to Practice"- George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
3. "Programming with C"- R S Bichkar- University Press.
4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and

A.Ananda Rao, Pearson Education. (UNIT-I)

5. Computer Fundamentals and C Programming- Second Edition- P.Chenna Reddy- Available at Pothi.com (http://pothi.com/pothi/book/dr-p-chenna-reddy-computer-fundamentals-and-c-programming).

Outcomes:

- Apply problem solving techniques in designing the solutions for a wide-range of problems
- Choose appropriate control structure depending on the problem to be solved
- Modularize the problem and also solution

I B.Tech. I - Semester **T Tu C**
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(A1004) ENGINEERING CHEMISTRY
(Common to ECE/EIE/ME/IT)

Objectives:

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand the concepts of chemistry and apply to various materials for engineering applications.

UNIT – I WATER QUALITY AND TREATMENT

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching powder, ozonisation)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment. External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

UNIT – II POLYMERS

i)Introduction: Basic concepts of polymerisation, Types of poloymerisation (Chain Growth (Addition), Step growth (Condensation)), Mechanism: cationic, anionic, free radical and coordination covalent.

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications of PVC, Teflon, Bakelite and nylons.

Elastomers

Natural Rubber; Processsing of natural rubbers, Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, Buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

ii) Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii) Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications

UNIT – III ELECTROCHEMISTRY

i) Galvanic cells, Nernest Equation, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries),Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen, Solid oxide)

ii) Corrosion: Introduction, type of corrosion (Concentration cell corrosion, Galvanic corrosion), Chemical (Dry) and Electrochemical (Wet) Theory of corrosion. Galvanic series,

factors affecting the

corrosion (Metal and environment). Prevention: Cathodic protection (Sacrificial anode and impressed current), Inhibitors (Anodic and cathodic), electroplating (Copper, nickel and chromium) and electroless plating (Copper and nickel)

UNIT – IV FUELS AND COMBUSTION

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems. Solid Fuels: Coal-Classification and Analysis (proximate and ultimate), Coke :Characteristics of metallurgical coke, Manufacture of Metallurgical Coke by Otto Hoffmann‟s by product oven processes.

Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline- Octane Number, Diesel -Cetane Number, Synthetic

Petrol: Bergius Processes, Fischer Troph‟s synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

Gaseous Fuels: Natural gas, Producer gas, Water gas, Coal gas and Biogas. Determination calorific value of Gases fuels by Junker‟s calorimeter.

Combustion: Basic principles and numerical problems, Flue Gas analysis by Orsat‟s apparatus.

UNIT – V CHEMISTRY OF ENGINEERING MATERIALS

i) Cement: Composition, Classification, preparation (Dry and Wet processes), Setting and Hardening (Hydration and Hydrolysis)

ii) Refractories: Introduction, Classification , properties and applications

iii) Lubricants: Introduction, classification (Solid, liquid, semi solid, emulsion and synthetic),Theory of lubrication (Thin film, Thick film & Extreme pressure) , properties of lubricants and applications.

iv) Carbon clusters: Fullerenes and Carbon Nano Tubes (CNT)

Text Books:

1. Engineering Chemistry, First Edition, Jayaveera KN, Subba Reddy GVand Ramachandraiah C, McGraw Hill Higher Education, New Delhi, 2013.
2. A Text Book of Enigneering Chemistry, 15th Edition, Jain and Jain, Dhanapathi Rai Publications, New Delhi, 2013.

References:

1. A Text book of Engineering Chemistry, 12th Edition, SS Dhara,Uma, S. Chand Publications, New Delhi, 2010.
2. Engineering Chemistry, First edition, K.B. Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Publications India Pvt Limited, 2010.
3. Engineering Chemistry, First edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013.

Outcomes: The student is expected to:

- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.
- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.

I B.Tech. I - Semester | **T** | **Tu** | **C**
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(A1005) ENVIRONMENTAL STUDIES
(Common to ECE/EIE/ME/IT)

Objectives:

To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development

– Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Text Books:

1. Text Book of Environmental Studies for Undergraduate Cources, Erach Bharucha, Universities Press Pvt Ltd, Hyderabad. 2nd Edition 2013.
2. Environmental Studies by Kaushik, New Age Pubilishers.

References:

1. Environmental Studies by Rajagopalan, Oxford Pubilishers.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

Outcomes:

- Students will get the sufficient information that will clarify modern environmental concepts like equitableuse of natural resources, more sustainable life styles etc.
- Students will realize the need to change their approach so as to perceive our own environmental issuescorrectly, using practical approach based on observation and self learning.
- Students become conversant with the fact that there is a need to create a concern for our environment thatwill trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
- By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.
- At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.

I B.Tech. I - Semester **P C**
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(A1006) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB (Common to All Branches)

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Objectives:

- To enable students to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

UNIT - 1

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels and consonants sounds
4. Phonetic Transcription

UNIT - II

5. Word Stress
6. Syllabification
7. Rules of word stress
8. Intonation

UNIT - III

9. Situational Dialogues
10. Role Plays
11. JAM
12. Describing people/objects/places

UNIT - IV

13. Debates
14. Group Discussions
15. Interview skills

UNIT - V

16. Video speech writing
17. Book reviews -oral and written

Minimum Requirements for ELCS Lab:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

   System Requirement (Hardware component):

   Computer network with LAN with minimum 60 multimedia systems with the following specifications:

   i) P – IV Processor
      a) Speed – 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality

Suggested Software:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. Walden InfoTech Software.

References:

1. A Textbook of English Phonetics for Indian Students 2nd Ed T. Balasubramanian. (Macmillian),2012.
2. A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. A Hand book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011
5. Spring Board Succes, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderbad, 2010.

Outcomes:

- Become active participants in the learning process and acquire proficiency in spoken English.
- Speak with clarity and confidence thereby enhance employability skills.

I B.Tech. I - Semester **P** **C**
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(A1010) ENGINEERING CHEMISTRY LAB
(Common to ECE/EIE/ME/IT)

Objectives:

- Will learn practical understanding of the redox reaction
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

List of Experiments:

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler‟s method
4. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
5. Determination of Alkalinity of Water
6. Determination of acidity of Water
7. Preparation of Phenol-Formaldehyde (Bakelite)
8. Determination of Viscosity of oils using Redwood Viscometer I
9. Determination of Viscosity of oils using Redwood Viscometer II
10. Determination of calorific value of gaseous fuels by Junker‟s Calorimeter
11. Conductometric estimation of strong acid using standard sodium hydroxide solution
12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
13. Potentio metric determination of iron using standard potassium dichromate
14. Colorometric estimation of manganese.
15. pH meter calibration and measurement of pH of water and various other samples.

(Any 10 experiments from the above list)

References:

1. Vogel‟s Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.

Outcomes:

- Would be confident in handling energy storage systems and would be able combat chemical corrosion
- Would have acquired the practical skill to handle the analytical methods with confidence.
- Would feel comfortable to think of design materials with the requisite properties
- Would be in a position to technically address the water related problems.

I B.Tech. I - Semester **P** **C**
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(A1502) COMPUTER PROGRAMMING LAB
(Common to All branches)

Objectives:

- Learn C Programming language
- To make the student solve problems, implement algorithms using C language.

List of Experiments/Tasks

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, To read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a Quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to „n‟ terms $e^x=1+x+x^2/2!+x^3/3!+x^4/4!+$--------
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.
    i. Find the sum of Diagonal Elements of a matrix.
    ii. Print Transpose of a matrix.
    iii. Print sum of even and odd numbers in a given matrix.
19. Write a program to accept a line of characters and print the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don‟t use library functions related to strings.
21. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
22. Write a program to split a „file‟ in to two files, say file1 and file2. Read lines into the „file‟ from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange‟s interpolation, Trapezoidal rule.

25. Write a program to read a set of strings and sort them in alphabetical order.
26. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    i. String length determination ii .Compare Two Strings
    iii. Concatenate them, if they are not equal iv. String reversing
27. Write programs using recursion for finding Factorial of a number, GCD, LCM, and solving Towers of Hanoi problem.
28. Write a program to exchange two numbers using pointers.
29. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
30. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
31. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
32. Write a program to find the square root of a number without using built-in library function.
33. Write a program to convert from string to number.
34. Write a program to implement pseudo random generator.
35. Write a program to generate multiplication tables from 11 to 20.
36. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
37. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
38. Write a program to find the execution time of a program.
39. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

Note:

1. Instructors are advised to conduct the lab in LINUX/UNIX environment also
2. The above list consists of only sample programs. Instructors may choose other programs to illustrate certain concepts, wherever is necessary. Programs should be there on all the concepts studied in Theory. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

References:

1. "How to Solve it by Computer", R.G. Dromey, Pearson.
2. "The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, Pearson.
3. "Let us C", Yeswant Kanetkar, BPB publications
4. "Pointers in C", Yeswant Kanetkar, BPB publications.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education.

Outcomes:

- Apply problem solving techniques to find solutions to problems
- Able to use C language features effectively and implement solutions using C language.
- Improve logical skills.

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

ELECTRONICS & COMMUNICATION ENGINEERING

I-II Semester

S.No	Course code	Subject	Th	Tu/Drg/Lab			Credits
1.	A1008	English for Professional Communication	3	1	-	-	3
2.	A1009	Mathematics – II	3	1	-	-	3
3.	A1201	Network Analysis	3	1	-	-	3
4.	A1003	Engineering Physics	3	1	-	-	3
5.	A1301	Engineering Drawing	0	-	6	-	3
6.	A1202	Network Analysis Lab	-	-	-	4	2
7.	A1007	Engineering Physics Lab	-	-	-	4	2
8.	A1302	Engineering and IT Workshop	-	-	-	4	2
			12	4	6	12	21

B.Tech. I - II Sem. (ECE) **T Tu C**
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(A1008) ENGLISH FOR PROFESSIONAL COMMUNICATION

1. INTRODUCTION:

English is a global language and has international appeal and application. It is widely used in a variety of contexts and for varied purposes. The students would find it useful both for social and professional development. There is every need to help the students acquire skills useful to them in their career as well as workplace. They need to write a variety of documents and letters now extending into professional domain that cuts across business and research also. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. OBJECTIVES:

1. To develop confidence in the students to use English in everyday situations.
2. To enable the students to read different discourses so that they appreciate English for science and technologies.
3. To improve familiarity with a variety of technical writings.
4. To enable the students to acquire structure and written expressions required for their profession.
5. To develop the listening skills of the students.

3. SYLLABUS:

UNIT –I

Topics: Group discussion, cause and effect, events and perspectives, debate, if conditional, essay writing.

Text: LESSONS FROM THE PAST from ***MINDSCAPES***

Importance of History - Differing Perspectives - Modern Corporatism - Lessons From The Past

UNIT-II

Topics: Idioms, essay writing, power point presentation, modals, listening and rewriting, preparing summary, debate, group discussion, role play, writing a book review, conversation

Text: 'ENERGY' from ***MINDSCAPES***

Renewable and Non-Renewable Sources - Alternative Sources -Conservation -Nuclear Energy

UNIT-III

Topics: Vocabulary, impromptu speech, creative writing, direct and indirect speech, fixed expressions, developing creative writing skills, accents, presentation skills, making posters, report writing

Text: 'ENGINEERING ETHICS' from ***MINDSCAPES***

Challenger Disaster - Biotechnology - Genetic Engineering - Protection From Natural Calamities

UNIT-IV

Topics: Vocabulary, Conversation, Collocation, Group discussion, Note-making, Clauses, Interpreting charts and tables , Report writing.
Text: 'TRAVEL AND TOURISM' from ***MINDSCAPES***
Advantages and Disadvantages of Travel - Tourism - Atithi Devo Bhava - Tourism in India
UNIT-V
Topics: Vocabulary, phrasal verbs, writing a profile, connectives, discourse markers, problem-solving, telephone skills, application letters, curriculum vitae, interviews (telephone and personal)
Text: 'GETTING JOB-READY' from ***MINDSCAPES***
SWOT Analysis - Companies And Ways Of Powering Growth - Preparing For Interviews
Prescribed Text
MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.

REFERENCES:
1**. Effective Tech Communication,** Rizvi,Tata McGraw-Hill Education, 2007.

2. **Technical Communication,** Meenakshi Raman, Oxford University Press.

3. **English Conversations Prcatice,** Grant Taylor, Tata Mc GrawHill publications,2013**.**

4**.Practical English Grammar.** Thomson and Martinet, OUP, 2010.

Expected Outcomes:
At the end of the course, students would be expected to:
1. Have acquired ability to participate effectively in group discussions.
2. Have developed ability in writing in various contexts.
3. Have acquired a proper level of competence for employability.

B.Tech. I - II Sem. (ECE)

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(A1009) MATHEMATICS – II
(Common to All Branches)

Objectives: Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution of partial differential equations.

UNIT – I

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.
Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula- Complex form of Fourier series.

UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT – V

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

REFERENCES:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes: The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

B.Tech. I - II Sem. (ECE)

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(A1201) NETWORK ANANLYSIS

Objective:

To help students develop an understanding on analyzing electrical circuits using various techniques. To make the student familiarize with the fundamental concepts of coupled circuits, resonance, filters and to analyze the transient response in electric circuits.

UNIT I

Circuit Analysis Techniques: Voltage and Current Laws, Basic Nodal and Mesh Analysis, ,Network Theorems- Linearity and Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Milliman's theorems. Source Transformation.

UNIT II

DC Transient Circuits : The Source free RL, RC & RLC Circuits. Natural & Forced Response of RL,RC & RLC Circuits. RC & RL Circuit responses to Pulse and Exponential signals.

Unit III

Sinusoidal steady state analysis: Characteristics of Sinusoids, Forced Response of Sinusoidal Functions, The Complex forcing Function, The Phasor, Phasor relationships for R,L, and C, Impedance, Admittance. Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power, Power Factor, Complex Power.

UNIT IV

Resonance: Introduction, Definition of 'quality factor **Q**' of inductor and capacitor, Series resonance, Bandwidth of the series resonant circuits, Parallel resonance (or anti-resonance), Conditions for maximum impedance, Currents in parallel resonance, , Bandwidth of parallel resonant circuits, General case of parallel resonance circuit. **Magnetically Coupled Circuits:** Mutual Inductance, Energy Considerations, The Linear Transformer, The Ideal Transformer

Unit V

Two Port Networks & Filters: Relationship of two port variables, Short circuit Admittance parameters, Open circuit Impedance parameters, Transmission Parameters, Hybrid Parameters, Relationship between parameter sets, Parallel connection of two port networks.

Filters: Introduction, the neper & decibel, Characteristic Impedance of symmetrical networks, Currents & voltage ratios as exponentials; the propagation constant, Hyperbolic trigonometry, Properties of symmetrical networks, Filter fundamentals; pass and stop bands, Behavior of characteristic impedance, The constant – k low pass filter, the constant – k high pass filter, band Pass Filters ,band reject filters - illustrated problems.

Text Books:

1. W H Hayt, J E Kemmerly and S M Durbin, "Engineering Circuit Analysis", Tata McGraw-Hill, 7th edition, 2010.
2. John D. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition, 2012.

Reference Books:

1. Van Valkenburg, "Network Analysis", PHI, 3rd Edition, 2011.
   N C Jagan & C Lakshminarayana "Network Analysis" BS Publications 3rd Edn.2014

B.Tech. I - II Sem. (ECE)

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(A1003) ENGINEERING PHYSICS
(Common to All Branches)

Objectives:

- To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
- To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and non-destructive evaluation using ultrasonic techniques.
- To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.
- To open new avenues of knowledge and understanding semiconductor based electronic devices , basic concepts and applications of semiconductors and magnetic materials have been introduced which find potential in the emerging micro device applications.
- To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

UNIT - I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics: Interference (Review) – Interference in thin film by reflection –Newton's rings –Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

Fiber optics: Introduction - construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in Optical fibers –Block diagram of Optical fiber communication system – Applications of optical fibers

UNIT – II

CRYSTALLOGRAPHY AND ULTRASONICS

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method.

Ultrasonics: Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT – III

QUANTUM MECHANICS AND ELECTRON THEORY

*Quantum Mechanics: M*atter waves – de'Broglie hypothesis and properties - Schrodinger's time dependent and independent wave equations – Physical significance of wave function - Particle in one dimensional infinite potential well.

Electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Source of electrical resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT – IV

SEMICONDUCTORS AND MAGNETIC MATERIALS

Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Formation of p-n junction.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative treatment) – Hysteresis - Soft and hard magnetic materials, applications of magnetic materials.

UNIT – V

SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

Superconductivity: Introduction - Effect of magnetic field - Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth - BCS theory (qualitative treatment) — Josephson effects –Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel –Applications of nanomaterials.

Text Books:

1. Engineering Physics – K.Thyagarajan, 5th Edition, MacGraw Hill Publishers, NewDelhi, 2014.
2. Physics for Engineers - N.K Verma, 1st Edition, PHI Learning Private Limited, New Delhi,2014.

References:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.
2. Engineering Physics – D K Pandey, S. Chaturvedi, 2nd Edition, Cengage Learning, New Delhi, 2013.
3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1nd Edition, Oxford University Press, New Delhi, 2015.

Outcomes:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.

- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting and magnetic materials are illustrated.

The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

B.Tech. I - II Sem. (ECE) **Th Drg C**
0 6 3

(A1301) ENGINEERING DRAWING
(Common to All Branches)

Objectives:

- To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
- To learn about various projections, to understand complete dimensions and details of object.
- Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance- Conventions in Drawing-Lettering – BIS Conventions. Curves used in Engineering Practice. a) Conic Sections including the Rectangular Hyperbola- General method only, b) Cycloid, Epicycloid and Hypocycloid

UNIT II

Scales: Plain, Diagonal and Vernier;

Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: lines inclined to one or both planes, Problems on projections, Finding True lengths.

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes.

Developments of Solids: Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

References:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, B.V.R. Guptha, J.K. Publishers

Outcomes:

- Drawing 2D and 3D diagrams of various objects.
- Learning conventions of Drawing, which is an Universal Language of Engineers.
- Drafting projections of points, planes and solids.

B.Tech. I - II Sem. (ECE) **P** **C**
4 **2**

(A1202) NETWORK ANALYSIS LAB

1. Verification of KCL & KVL for any network.
2. Verification of Superposition Theorem with analysis.
3. Verification of Thevenin's Theorem with analysis.
4. Verification of Maximum Power Transfer Theorem with analysis.
5. Analysis of RL & RC circuits for pulse excitation.
6. Frequency response of series resonance circuit with analysis and design.
7. Frequency response of parallel resonance circuit with analysis and design.
8. Design and frequency response of constant 'k' low pass & high pass filters.
9. Design and frequency response of Band pass filter.
10. Design and frequency response of Notch filter.
11. Determination of phase of a sinusoidal signal when passed through RL or RC circuits.
12. Impedance transformation through transformer.

Note:- Ten experiments must be conducted in the semester.

Components & Equipment required:-

1. Bread boards, passive components, R, L, and C with different ratings.
2. Dual power supplies, function generators, CROs.

B.Tech. I - II Sem. (ECE) **P** **C**
4 **2**

(A1007) ENGINEERING PHYSICS LABORATORY
(Common to All Branches)

Objectives:

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect
  in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed during the I year I semester

1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
2. Determination of wavelength of given source using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle of an optical fiber.
4. Energy gap of a Semiconductor diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss for a given magnetic material.
7. Determination of Crystallite size using X-ray pattern (powder) using debye-scheerer method.
8. Determination of particle size by using laser source.
9. Determination of dispersive power of a prism.
10. Determination of thickness of the thin wire using wedge Method.
11. Laser : Diffraction due to single slit
12. Laser : Diffraction due to double slit
13. Laser: Determination of wavelength using diffraction grating
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Synthesis of nanomaterial by any suitable method.

References:

1. Engineering Physics Practicals – NU Age Publishing House, Hyderabad.
2. Engineering Practical physics – Cengage Learning, Delhi.

Outcomes:

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.

Would recognize the significant importance of nanomaterials in various engineering fields.

B.Tech. I - II Sem. (ECE) **P** **C**
4 **2**

(A1302) ENGINEERING & I.T. WORKSHOP

ENGINEERING WORKSHOP

Course Objective:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:

a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
e. Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

2. TRADES FOR DEMONSTRATION:

a. Plumbing
b. Machine Shop
c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

References:

1. *Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009*
2. *Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.*
3. *Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e Vikas*
4. *Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.*

I.T. WORKSHOP

Course Objective:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

Learning Outcome:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

Preparing your Computer (5 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet (4 weeks)

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools (6 weeks)

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the color, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations : creating, opening, saving and running the presentations, Selecting the style

for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

References:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

B. TECH –ELECTRONICS AND COMMUNICATION ENGINEERING

III SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1014	Linear Algebra and Complex Variables	BS	3	1	0	4	30	70	100
A1401	Electronic Devices and Circuits	ES	3	1	0	4	30	70	100
A1402	Digital Logic Design	ES	4	0	0	4	30	70	100
A1403	Signals and Systems	PC	3	1	0	4	30	70	100
A1404	Probability Theory and Stochastic Processes	PC	3	0	0	3	30	70	100
A1405	Electronic Devices and Circuits Laboratory	ES	0	0	3	1.5	30	70	100
A1406	Digital Logic Design Laboratory	ES	0	0	3	1.5	30	70	100
A1407	Basic Simulation Laboratory	ES	0	0	2	1	30	70	100
A1013	Verbal Ability & Logical Reasoning	HS	1	0	0	1	30	70	100
		TOTAL	**17**	**03**	**08**	**24**	**270**	**630**	**900**

IVSEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1408	Electronic Circuit Analysis	PC	3	0	0	3	30	70	100
A1409	Analog Communication Systems	PC	4	0	0	4	30	70	100
A1410	Electromagnetic Theory and Transmission Lines	PC	3	1	0	4	30	70	100
A1211	Control Systems	PC	3	1	0	4	30	70	100
A1216	Electrical Technology	ES	3	0	0	3	30	70	100
A1411	Electronic Circuit Analysis Laboratory	PC	0	0	3	1.5	30	70	100
A1412	Analog Communication Systems Laboratory	PC	0	0	3	1.5	30	70	100
A1217	Electrical Technology Laboratory	ES	0	0	2	1	30	70	100
A1012	Quantitative Aptitude-1	BS	1	0	0	1	30	70	100
A1413	Comprehensive Online Examination	PW	0	0	0	1	-	100	100
		TOTAL	**17**	**02**	**08**	**24**	**270**	**730**	**1000**

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Title of the Course :	**LINEAR ALGEBRA AND COMPLEX VARIABLES**			
Branches for which this course is offered**:**	**III Semester (ECE& EEE)**	L	T	C
		3	1	4

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, the basic principles (both theory and applications) of differentiable complex-valued functions of a single complex variable. Topics include the complex number system, Cauchy-Riemann conditions, analytic functions and their properties, Complex integration and line integrals,Cauchys theorem, Cauchy representation, conformal mapping, Taylor and Laurent Series expansions; the calculus of residues and various applications The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Outcomes :	
After successful competion of the course , the student will be able to	
CO1	Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations, linear dependence and independence
CO2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
CO3	Define a quadratic form and determine its nature using Eigen values.Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
CO4	Analyze the functions of complex variable which include continuity, differentiability and analyticity along with evaluation of Cauchy-Riemann equations in Cartesian and polar coordinates.
CO5	Employ the Cauchy's integral theorem along with integral formula along with expansion in Taylor's series, Maclaurin's series and Laurent series.
CO6	Evaluate the residual formula through Laurent series and residue theorem along with evaluation of improper real integrals.

Course Content:		
Unit-I	**THEORY OF MATRICES, EIGEN VALUES AND EIGEN VECTORS**	**Lecturer Hours:10Hrs**
Rank of a matrix by reducing to Echelon form and Normal form, Consistency of system of linear equations using the rank of a matrix. Eigen values and Eigenvectors of real and complex matrices, Properties of Eigen values and Eigen vectors of real and complex matrices (without		

proof), Cayley-Hamilton theorem (statement and verification), Inverse and powers of a matrix using Cayley-Hamilton theorem, Diagonalization of a matrix.		
Unit-II	**QUADRATIC FORMS AND BETA-GAMMA FUNCTIONS**	**Lecturer Hours:7 Hrs**
Quadratic forms up to three variables: Rank, index, signature and nature of quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation. Beta-Gamma functions: Evaluation of improper integrals using Beta-Gamma functions**.**		
Unit-III	**DIFFERENTIATION OF COMPLEX FUNCTIONS**	**Lecturer Hours:9Hrs**
Continuity, differentiability and analyticity of functions of a complex variable, Cauchy-Riemann equations in cartesian and polar form(without proof), harmonic and conjugate harmonic functions, Milne-Thomson method. Conformal Mapping: Transformation of e^{Z},z^{2}Translation, rotation, inversion, bilinear transformation and their properties, determination of bilinear transformation of three given points.		
Unit-IV	**INTEGRATION OF COMPLEX FUNCTIONS**	**Lecturer Hours:8Hrs**
Complex integration: Line integral in complex plane, Cauchy's integral theorem and Cauchy's integral formula (without proof), Zeros and singularities of analytic function. Complex power series: Taylor's series, Laurent's series		
Unit -V	**CALCULUS OF RESIDUES**	**Lecturer Hours:8Hrs**
Residue-Evaluation of residue by laurent series- Residue theorem, Evaluation of real definite integrals of the form (i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ (ii) $\int_{-\infty}^{\infty} f(x)dx.$		

Text Books :
1. Higher Engineering Mathematics, 43rd Edition, Grewal B.S New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2018), Engineering Mathematics Vol – II&III, 17th Revised Edition, New Delhi, S. Chand & Company Limited.
3. B.V. Ramana, Higher Engineering Mathematics, 23rdReprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.

References :
1. Advance Engineering mathematics, by Erwin kreyszig, wiley India.
2. Engineering Mathematics, Volume –III, E. Rukmangadachari&E.Keshava Reddy,Pearson Publisher

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**ELECTRONIC DEVICES AND CIRCUITS**			
Branch for which this course is offered	**III Semester (ECE& EEE)**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview:
This course provides fundamentals of electronic devices and an understanding of a range of discrete semiconductor devices, including design, construction and testing of experimental electronic circuits. Topics covered in this course include: p-n junction diodes, special diodes construction and operation. Power supplies: rectification, filtering, regulation. BJT's, FET's principle and operation. Bias and stabilization of electronic circuits.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the operation and characteristics of PN diode with diode's applications in electronic circuits.
CO2	Formulate the electrical models for special semiconductor diodes like Tunnel diode, LED and Photodiode.
CO3	Analyze various rectifiers and filter circuits used in regulated power supplies.
CO4	Compare and contrast the construction, working principles, characteristics and applications of major electronic devices like BJT, FET and MOSFET.
CO5	Design and analyze the DC bias circuitry of BJT.
CO6	Design and analyze the small signal models of BJT& FET Amplifiers at low frequencies.

Course Content:		
Unit – I	**PN DIODE CHARACTERISTICS**	**Lecture Hours: 12**
PN diode – Operation, biasing, characteristics, equation, static and dynamic resistance.Effect of temperature on VI characteristics of a diode, ideal vs practical diode, diode equivalent circuits. **Special Diodes:** Zener diode, Tunnel diode, LED, Photo diode– construction, operation and Characteristics.		
Unit – II	**RECTIFIERS & FILTERS**	**Lecture Hours: 10**
Block diagram of regulated power supply,Half wave rectifier, Full wave rectifier and Bridge rectifier, characteristics of rectifiers and comparison of rectifier circuits. Filters – Derivation of ripple factor for Inductor, Capacitor, L-section and Π section filters, Zener diode as a voltage regulator.		
Unit – III	**TRANSISTOR CHARACTERISTICS (BJT & FET)**	**Lecture Hours: 08**
BJT: Structure and principle of operation, Transistor as an amplifier, Transistor configurations (CE, CB, CC), input and output characteristics.		

FET: Construction, operation and characteristics of JFET and MOSFET.		
Unit – IV	**TRANSISTOR BIASING**	**Lecture Hours: 09**
DC & AC load line, criteria for fixing operating point, factors affecting operating point, Methods of biasing– fixed bias, self-bias, collector to base bias, stability factors (S, $S^{'}$, $S^{''}$). Thermal runaway, condition for thermal stability.		
Unit – V	**ANALYSIS OF TRANSISTOR AMPLIFIER AT LOW FREQUENCY**	**Lecture Hours: 09**
BJT: Analysis of CE, CB and CC amplifiers using exact and approximate h-parameter model. **FET:**Analysis of CS and CD amplifiers.		

Text Books:	
1	J. Millman, C. Halkias, "Electronic Devices and Circuits", TMH, 4th Edition, 2010.
2	R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications, 9th Edition, 2006.
References:	
1	Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.
2	Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition.
3	David A.Bell, "Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2009.
4	J.B.Gupta, "Electronic Devices and Circuits", 3rd Edition, S.K.Kataria& Sons, 2008.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**DIGITAL LOGIC DESIGN**			
Branch for which this course is offered	**III Semester (ECE)**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview:
To study the basic philosophy underlying the various number systems, negative number representation, binary arithmetic, binary codes, error detecting and correcting binary codes, the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques, the combinational logic design of various logic and switching devices and their realization, the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations and the programmable logic devices and their use in realization of switching functions.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand common forms of number representation in logic circuits.
CO2	Make use of Boolean algebra postulates-map and tabulation methods to minimize boolean functions and to implement with logic gates.
CO3	Construct and analyze various combinational circuits used in digital systems such as adders, subtractors and code-convertors.
CO4	Construct and analyze various combinational circuits used in digital systems such as decoders, encoders, and data selectors.
CO5	Construct and analyze various sequential circuits used in digital systems such as flip-flops, registers and counters.
CO6	Design various PLDs such as ROMs, PALs, PLAs and PROMs.

Course Content:		
Unit-I	**DIGITAL SYSTEMS AND BINARY NUMBERS**	Lecture Hours: 12
Review of number systems and their conversions,Representation of negative numbers, binary codes, Hamming code. Boolean algebra, Theorems and properties of Boolean algebra, canonical and standard forms of SOP/POS form, digital logic gates, Implementation of universal gates.		
Unit-II	**GATE LEVEL MINIMIZATION**	Lecture Hours: 10
The k-map method, four-variable map, five-Variable map, Sum of Products and Product of Sums simplification, don't-care conditions, realization using universal gates, AND-OR-INVERT, OR-AND-INVERT models realization, exclusive-OR properties, The tabulation(QuineMccluskey) method, determination of Prime implicants and essential prime implicants.		
Unit-III	**COMBINATIONAL LOGIC**	Lecture Hours: 15
Introduction, analysis and design with basic logic gates(code converters), comparators, data		

selectors, priority encoders, decoders, full adder, serial binary adder, parallel binary adders-ripple-carry adder, carry-look ahead adder, BCD adder, subtractor and binary multiplier.		
Unit-IV	**SEQUENTIAL LOGIC**	Lecture Hours: 13
Memory elements and their excitation functions SR, JK, T, and D latches and flip-flops, master slave JK flip-flop, analysis and design of clocked sequential circuits, state minimization and assignment. Registers And Counters**:** Registers, classification of registers, Bidirectional shift register, design of ripple counters, synchronous counters, ring counter, Twisted ring counter		
Unit-V	**MEMORY AND PROGRAMMABLE LOGIC**	Lecture Hours: 10
Types of memories, SRAM, DRAM, ROM, memory decoding, programmable logic array, programmable array logic, Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices.		

Text Books:	
1.	M. Morris Mano, Michael D. Ciletti (2008), *Digital Design*, 4th edition, Pearson Education/PHI, India.
2.	Thomas L. Floyd (2006), *Digital fundamentals*, 9th edition, Pearson Education International.
References:	
1.	Zvi. Kohavi (2004), *Switching and Finite Automata Theory*, Tata McGraw Hill, India.
2.	C.V.S. Rao (2009), *Switching and Logic Design*, 3rd edition, Pearson Education, India.
3.	Donald D.Givone (2002), *Digital Principles and Design*, Tata McGraw Hill, India.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**SIGNALS AND SYSTEMS**			
Branch for which this course is offered	**III Semester (ECE)**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview
This course presents a comprehensive treatment of signals and systems at an introductory level. This is an introductory course to study continuous time and discrete time signals, a topic that forms an integral part of engineering systems in many diverse areas including seismic data processing, communications, speech processing, image processing, defence electronics, consumer electronics and consumer products. The course presents and integrates the basic concepts for both continuous-time and discrete time signals and systems. Signal and system representations are developed for both time and frequency domains. This course will serve as a central building block for students interested in further studying information processing in any form.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the concepts of different signals and systems in continuous &discrete time domains.
CO2	Find the Fourier series representation of different Periodic signals.
CO3	Plot the spectrum of continuous time signals and verify the sampling theorem for low pass signals.
CO4	Evaluate the Fourier transform of Discrete-time signals and prove the properties of DTFT.
CO5	Find the response of LTI&LTV systems and distinguish between signal & system bandwidths.
CO6	Understand the stability of systems through the ROC concept of Laplace and Z-transforms.

Course Content:		
Unit-I	**CLASSIFICATION OF SIGNALS AND SYSTEMS**	**Lecture hours: 11**
Classification of Signals: continuous time and discrete time; analog and digital; Periodic and aperiodic, Energy and power, Even and odd, Causal and non-causal, Deterministic and random; Singularity functions: Unit Impulse, Step, ramp and parabolic signals; Operations on signals: Time shifting, Time scaling, Time reversal and combined operations. Classification of systems: Linear and non-linear, Time-invariant and time varying, Instantaneous and dynamic, Causal and non-causal, Continuous time and discrete time, Analog and digital, Invertible and non-invertible &Stable and unstable.		
Unit – II	**FOURIER SERIES AND FOURIER TRANSFORM OF CONTINUOUS TIME SIGNALS**	**Lecture hours:10**

Analogy between vectors and signals; Orthogonality in complex functions,Definition of Fourier series, Trigonometric and Exponential Fourier series. Fourier transforms of different signals; Properties of Fourier transform; Hilbert transform; Statement and proof of sampling theorem for Lowpass signals.		
Unit – III	**CONVOLUTION, CORRELATION AND TRANSMISSION OF SIGNALS**	**Lecture hours: 09**
Convolution and correlation of continuous time signals; Relation between convolution and correlation; Auto correlation and cross correlation functions; Causality and physical realizability; Distotionless transmission; Signal bandwidth and system bandwidth. Transfer function of an LTI system. Filter characteristics of linear systems. Response of LTI and LTV systems; Relationship between bandwidth and rise time; Energy and Power spectral densities.		
Unit – IV	**DISCRETE TIME FOURIER SERIES AND FOURIER TRANSFORM**	**Lecture hours: 09**
Discrete Time Fourier series; Discrete time Fourier transform of different signals; Properties of Discrete time Fourier transform; Convolution and correlation of discrete time signals.		
Unit – V	**ANALYSIS OF SIGNALS AND SYSTEMS IN S AND Z-DOMAINS**	**Lecture hours:09**
Relation between Laplace and Fourier transform; Forward and inverse transform; Region of convergence; Properties of Laplace transform; Solution of differential equations using Laplace transform with initial conditions; Natural response; Forced response; Steady state response and transient response; Stability analysis in s-domain; Relation between DTFT and Z-transform; z-transform of different sequences; Inverse z-transform; Properties of z-transform; Solution of difference equations using z-transform with initial conditions; stability analysis in z-domain.		

Text Books:	
1	B. P. Lathi, “Principles of Linear Systems and Signals”, Second Edition, 2009,Oxford University press,
2	A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, Pearson, 2nd Edn.
References:	
1	Simon Haykin and Van Veen, “Signals & Systems”, Wiley, 2nd Edition.
2	B.P. Lathi, “Signals, Systems & Communications”, 2009,BS Publications.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**PROBABILITY THEORY AND STOCHASTIC PROCESS**			
Branch for which this course is offered	**III Semester (ECE)**	**L**	**T**	**C**
		3	**0**	**3**

Course Overview
The course addresses the concepts, principles and techniques of sets and probability and randomvariable and random process.Thecourse teaches the fundamentals of probability applying the concepts of mean and variance and development techniques.This course forms the basis for the study of advanced subjects like signals and systems. Students will learn probability concepts and difference between random variable and random process and estimation of power spectral density.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Recall the basic parameters like probability concepts, principles of random variables
CO2	Apply probability distribution and density functions to evaluate the performance of
CO3	Describe the characteristics of real, physical world random phenomenon.
CO4	Evaluate practical probabilistic problems involving random input signals.
CO5	Illustrate about processes by means of autocorrelation, cross correlation and covariance functions.
CO6	Describe the performance of systems with random signals & understand the concept of Noise as applicable to linear Systems.

Course Content:		
Unit-I	**PROBABILITY AND RANDOM VARIABLES**	**Lecture hours: 12**
Experiments, SampleSpaces, Events, definition of Probability, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bays'Theorem, and Independent Events,RandomVariable, Conditions for a Function to be a RandomVariable, classification of Random Variable, Distribution and Density functions, Properties, Various distribution functions, Conditional Distribution and Density functions, Operations on Single Random Variables, Problems.		
Unit – II	**MULTIPLE RANDOM VARIABLES**	**Lecture hours:12**
Joint Distributionand Density Functions, Conditional Distribution and Density Functions, Statistical Independence, Sum of Several Random Variables, Central Limit Theorem, Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random		

Variables, Problems.		
Unit – III	**STOCHASTIC PROCESSES -TEMPORAL CHARACTERISTICS**	**Lecture hours:10**
The Random Process, Classification of Processes, Distribution and Density Functions, Stationary and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationary, (N- Order) and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-Ergodic Processes, Autocorrelation Function and Cross-Correlation Function, Covariance Functions, Gaussian Random Processes, Poisson Random Process, Problems.		
Unit – IV	**STOCHASTIC PROCESSES – SPECTRAL CHARACTERISTICS**	**Lecture hours: 7**
Properties of Power DensitySpectrum, Relationship between Power Spectrum and Autocorrelation Function, Propertiesof Cross-Power Density Spectrum, Relationship between Cross-Power Spectrum and Cross-Correlation Function, Problems.		
Unit – V	**RANDOM SIGNAL RESPONSE OF LINEAR SYSTEMS**	**Lecture hours: 7**
System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Functionand Cross-Correlation Functions of System Response, Power Density Spectrum of Response, Cross-Power Density Spectrums of Spectrum of Response, Band pass, Band-Limited and Narrowband Processes, Properties, Problems.		

Text Books:	
1	Peyton Z. Peebles, “Probability, Random Variables & Random Signal Principles”, Tata McGraw-Hill, 4th Edition, 2001.
2	Athanasius Papoulis, S. UnnikrishnaPillai, “Probability, Random Variables and Stochastic Processes”, PHI, 4th Edition, 2002.
References:	
1	Henry Stark, John W. Woods, “Probability and Random Processes with Application to Signal Processing”, Pearson Education, 3rd Edition, 2014.
2	George R. Cooper, Clave D. MC Gillem, “Probability Methods of Signal and System Analysis”, Oxford, 3rdEdition, 1999.
3	R.P.Singh and S.D. Sapre, Communication Systems Analog & Digital, 2nd edition,TMH - 2007.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**ELECTRONIC DEVICES AND CIRCUITS LABORATORY**			
Branch for which this course is offered	**III Semester (ECE& EEE)**	**L**	**T**	**C**
		0	**3**	**1.5**

Course Overview:
This Lab provides the students to get an electrical model for various semiconductor devices. Students can find and plot V_I characteristics of all semiconductor devices. Student learns the practical applications of the devices. Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Analyze the description of CRO and Function generator panels.
CO2	Find the cut-in voltage, static and dynamic resistances from V-I characteristics of PN junction diode.
CO3	Find the breakdown voltage and Regulation characteristics of Zener diode.
CO4	Compute the ripple content present in half wave and full wave rectifiers with and without filters.
CO5	Plot the characteristics of BJT and FET.
CO6	Draw the frequency response of single stage amplifiers at low, mid and high frequencies.

Course Content:		
Exp – 1	**Electronic Workshop Practice** Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.	**No. of Hours: 3**
Exp – 2	**Electronic Workshop Practice** Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.	**No. of Hours: 3**
Exp – 3	**Electronic Workshop Practice** Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.	**No. of Hours: 3**
Exp – 4	P-N Junction Diode Characteristics	**No. of Hours: 3**

Exp – 5	Zener Diode Characteristics	**No. of Hours: 3**
Exp – 6	Zener Diode as a Voltage Regulator	**No. of Hours: 3**
Exp – 7	Half-wave Rectifier without and with C-filter	**No. of Hours: 3**
Exp – 8	Full-wave Rectifier without and with C-filter	**No. of Hours: 3**
Exp – 9	BJT Characteristics(CE Configuration)	**No. of Hours: 3**
Exp – 10	BJT Characteristics (CB Configuration)	**No. of Hours: 3**
Exp – 11	FET Characteristics(CS Configuration)	**No. of Hours: 3**
Exp – 12	Transistor Biasing	**No. of Hours: 3**
Exp – 13	CE Amplifier	**No. of Hours: 3**

Text Books:	
1	J. Millman, C. Halkias, "Electronic Devices and Circuits", TMH, 4th Edition, 2010.
2	R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications, 9th Edition, 2006.
References:	
1	Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.
2	Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition.
3	David A.Bell, "Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2009.
4	J.B.Gupta, "Electronic Devices and Circuits", 3rd Edition, S.K.Kataria& Sons, 2008.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**DIGITAL LOGIC DESIGN LABORATORY**			
Branch for which this course is offered	**III Semester (ECE)**	**L**	**T**	**C**
		0	**3**	**1.5**

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

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Design digital logic circuits using NI Lab VIEW software.
CO2	VerifythelogicaloperationsofthedigitalICsinthelaboratory.
CO3	Analyze the functionality of Combinational circuits using NI Lab VIEW.
CO4	Analyze the functionality of Sequential Circuits using NI Lab VIEW.
CO5	Design and analyze the code converters using NI Lab VIEW.
CO6	Analyze the functionality of Combinational circuits and Sequential Circuits using Virtual lab.

Course Content:		
PART A: List of Experiments using Hardware		
Exp – 1	Realization of logic gates	**No. of Hours: 3**
Exp – 2	Implementation and verification of Full adder	**No. of Hours: 3**
Exp – 3	Implementation and verification of multiplexers	**No. of Hours: 3**
PART – B: List of Experiments using NI LabVIEW		
Exp – 4	Introduction to NI Lab VIEW	**No. of Hours: 3**
Exp – 5	Realization of logic gates	**No. of Hours: 3**
Exp – 6	Realization of Boolean function using basic gates and using Universal gates	**No. of Hours: 3**
Exp – 7	Implementation and verification of Code Converters	**No. of Hours: 3**
Exp – 8	Implementation and verification of multiplexers	**No. of Hours: 3**
Exp – 9	Implementation and verification of Half adder, Full adder and parallel adder	**No. of Hours: 3**
Exp – 10	Design and verification of Flip-flops	**No. of Hours: 3**

Exp – 11	Implementation and verification of magnitude comparators	**No. of Hours: 3**
Exp – 12	Design and implementation of synchronous and ripple counters	**No. of Hours: 3**
Exp – 13	Analysis and Synthesis of Boolean Relations using Digital Comparators (Virtual Lab Demo)	**No. of Hours: 3**

Text Books:	
1	Text Book1 (T1): M. Morris Mano, Michael D. Ciletti (2008), Digital Design, 4th edition, Pearson Education/ PHI, India.
2	Thomas L. Floyd (2006), *Digital fundamentals*, 9th edition, Pearson Education International.
References:	
1	Zvi. Kohavi (2004), *Switching and Finite Automata Theory*, Tata McGraw Hill, India.
2	C.V.S. Rao (2009), *Switching and Logic Design*, 3rd edition, Pearson Education, India.
3	Donald D.Givone (2002), *Digital Principles and Design*, Tata McGraw Hill, India.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**BASIC SIMULATION LABORATORY**			
Branch for which this course is offered	**III Semester (ECE)**	**L**	**T**	**C**
		0	**2**	**1**

Course Overview
MATLAB is the most useful tool for the electronics and communication engineers to perform different operations and tasks more easily. The basic simulation lab involves in generating different signals and sequences, operations on signals, convolution between signals and sequences, correlation between signals and sequences using MATLAB. Also involves in verification of sampling theorem and checking the random process for wide sense stationary using MATLAB.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Generate different signals and sequences using MATLAB
CO2	Perform correlation and convolution of signals and sequences
CO3	Find the Fourier and Laplace transform of the given functions
CO4	Plot the pole-zero map of the given transfer function in S& Z planes
CO5	Find mean and variance & check the wide sense stationary of the Stochastic process
CO6	Remove the noise by auto correlation / cross correlation in a given signal corrupted by noise.

S.No	**Name of the Experiment**	**Lab hours**
Exp – 1	Basic operations on matrices	**No. of Hours: 2**
Exp – 2	Generation of various signals and sequences	**No. of Hours: 2**
Exp – 3	Operations on signals and sequences	**No. of Hours: 2**
Exp – 4	Finding even and odd components & real and imaginary parts of a signal and sequence	**No. of Hours: 2**
Exp – 5	Verification of linearity property of a system	**No. of Hours: 2**
Exp – 6	Verification of time invariance property of a system	**No. of Hours: 2**
Exp – 7	Computation of unit impulse and unit step response of a system	**No. of Hours: 2**
Exp – 8	Computation of frequency response of a system	**No. of Hours: 2**
Exp – 9	Convolution between signals and sequences	**No. of Hours: 2**
Exp – 10	Autocorrelation and cross correlation between signals and sequences	**No. of Hours: 2**
Exp – 11	Finding the Fourier transform of a given signal and plotting its magnitude and phase Spectrum	**No. of Hours: 2**
Exp – 12	Waveform synthesis using Laplace transform	**No. of Hours: 2**

Exp – 13	Sampling theorem verification.	**No. of Hours: 2**
Exp – 14	Removal of noise by auto correlation / cross correlation in a given signal corrupted by noise.	**No. of Hours: 2**
Exp – 15	Generation of Gaussian noise (Real and Complex), computation of its mean, M.S.Value and its skew, kurtosis, and PSD, Probability Distribution Function.	**No. of Hours: 2**
Exp – 16	Checking a Random Process for Stationary in Wide Sense	**No. of Hours: 2**
Exp – 17	Verification of Wiener-Khinchne relations	**No. of Hours: 2**
Exp – 18	Impulse response of a raised cosine filter.	**No. of Hours: 2**
Exp – 19	Extraction of periodic signal asked by noise using correlation	**No. of Hours: 2**
Exp – 20	Locating zeros and poles, and plotting the pole-zero maps in s-plane and z-plane for the given transfer function	**No. of Hours: 2**

Text Books:	
1	Basic Simulation Lab with MATLAB by Bhanu Bhaskara &Siddhartha Bhaskara, TMH2011
2	Edward.W.Kamen & Bonnie.S.Heck, Fundamentals of Signals and Systems Using the Web and MATLAB, 3e,Pearson 2014.
References:	
1	B. P. Lathi, “Linear Systems and Signals”, Second Edition, Oxford University press,
2	A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, Pearson, 2nd Edn.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

Title of the Course	**VERBAL ABILITY AND LOGICAL REASONING**			
Branch for which this course is offered	**III Semester**	**L**	**T**	**C**
		1	**0**	**1**

Course Overview:
This course builds to improve the vocabulary, verbal reasoning, abstract and spatial reasoning.

Course Content:		
Unit – I	**CODING AND DECODING**	Lecture Hours: 7
Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out		
Unit – II	**ARTICLES AND TENSES, DIRECTION SENSE**	Lecture Hours: 7
a)Articles and Tenses: Introduction, usage of articles, Omission of Articles, Types of tenses, Forms and Usage of tenses b)Direction Sense:Introduction, Distance method, Facing Method and Shadow Method		
Unit – III	**BLOOD RELATIONS, VOICES AND FORMS OF SPEECH**	Lecture Hours: 7
a) Blood Relations: Introduction, Direct, Puzzle and Coded models b) Voices and Forms of Speech: Introduction, conversion of active and passive voice, conversions of direct and indirect speech.		
Unit – IV	**DATA ARRANGEMENTS, SYLLOGISMS**	Lecture Hours: 7
a) Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements b) Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method		
Unit – V	**VISUAL REASONING, SENTENCE CORRECTION**	Lecture Hours: 7
a) Visual Reasoning: Patterns, Folded Images, Cubes and Analytical Reasoning b) Sentence Correction: Subject-Verb Agreement, Pronoun Antecedent, Parallelism, Verb-Time Sequence Error, Determiners and Modifiers		

Text Books:	
1	A Modern Approach to Logical Reasoning Book by R.S. Aggarwal and VikasAggarwal.
2	Test of Reasoning Paperback by Edgar Thorpe and Logical Reasoning by Arun Sharma

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**ELECTRONIC CIRCUIT ANALYSIS**			
Branch for which this course is offered	**IV Semester (ECE)**	**L**	**T**	**C**
		3	**0**	**3**

Course Overview:
This course considers the mathematical modeling of active solid state devices and the analysis and design of single and multistage circuits. Small and large signal amplifiers are analyzed and designed and the circuits are implemented in the laboratory. Topics covered in this course include small signal low and high frequency transistor amplifier models, feedback amplifiers, oscillators, multistage amplifiers, power amplifiers and tuned amplifiers. Circuit simulation software is utilized as an engineering design tool.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Design and analyze the small signal models of BJT& FET Amplifiers at high frequencies.
CO2	Analyze the frequency response of single & multi-stage amplifiers with compound connections.
CO3	Understand and analyze the basic analog building blocks of Feedback Amplifiers.
CO4	Design basic analog building blocks for LC and RC oscillator Circuits.
CO5	Evaluate the efficiency of Large signal or Power amplifiers.
CO6	Explain the concept of tuned amplifiers & evaluate the resonant frequency for tuned amplifiers.

Course Content:		
Unit – I	**ANALYSIS OF TRANSISTOR AMPLIFIER AT HIGHFREQUENCY**	**Lecture Hours: 10**
BJT: Hybrid-π Common Emitter transistor model, determination of high-frequency parameters in terms of low-frequency (hybrid) parameters. **FET:** Analysis of CS and CD amplifiers.		
Unit – II	**MULTISTAGE AMPLIFIERS**	**Lecture Hours: 10**
Methods of coupling**,** Analysis of two stage amplifier, Cascode amplifier, Darlington pair amplifier, Effect of cascading on gain and bandwidth.		
Unit – III	**FEEDBACK AMPLIFIERS**	**Lecture Hours: 09**
Characteristics of negative feedback amplifiers, feedback topologies- voltage series feedback, voltage shunt feedback, current series feedback, current shunt feedback.		
Unit – IV	**OSCILLATORS**	**Lecture Hours: 09**
Barkhausen criteria, RC Oscillators – Phase Shift Oscillator, Wein Bridge Oscillator, LC Oscillators - Hartley and Colpitt's oscillators, Crystal oscillator.		
Unit – V	**POWER AMPLIFIERS**	**Lecture Hours: 10**

Series fed and Transformer Coupled class A power amplifier, distortion in amplifiers, Class B Amplifier, Push-pull and complementary symmetry power amplifiers, Class AB amplifier, Class C amplifier. Tuned amplifiers.

Text Books:	
1	J. Millman, C. Halkias, "Electronic Devices and Circuits", TMH, 4th Edition, 2010.
2	Donald A. Neaman, "Electronic Circuit Analysis and Design", McGraw Hill.
References:	
1	R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications, 9th Edition, 2006.
2	Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition.
3	Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.
4	J.B.Gupta, "Electronic Devices and Circuits", 3rd Edition, S.K.Kataria& Sons, 2008.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**ANALOG COMMUNICATION SYSTEMS**			
Branch for which this course is offered	**IV Semester (ECE)**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview
This course provides the foundational education in Analog Communication systems, and applications. The course teaches the acquire knowledge on the basic concepts of Analog Communication Systems. Analyze the analog modulated and demodulated systems. Verify the effect of noise on the performance of communication systems. Know the fundamental concepts of information and capacity.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	To Understand the basic concepts of the analog communication systems.
CO2	To Analyze various analog continuous wave modulation and demodulation techniques including AM, FM and PM.
CO3	Evaluate the performance of the communication system in the presence of noise.
CO4	Analyze various analog pulse modulation and demodulation techniques including AM, FM and PM.
CO5	To calculate information rate and channel capacity of a discrete communication channel .
CO6	To Acquire life long experience in doing projects related to communication systems.

Course Content:		
Unit-I	**AMPLITUDE MODULATION &DEMODULATION**	**Lecture hours: 14**
Elements of communication systems, Modulation,Amplitude Modulation, single tone modulation,Generation of AM signals,Demodulation of AM signals, power calculations of AM,DSBSC-Generation of DSBSC signals,Demodulation of DSBSC signals,SSB-Generation of SSB signals,Demodulation of SSB signals,VSB-modulation&demodulation, Quadrature amplitude modulation (QAM), CarrierAcquisition,Frequency division multiplexing (FDM)and Super-heterodyne AM receiver, Problems.		
Unit – II	**ANGLE MODULATION & DEMODULATION**	**Lecture hours: 12**
Introduction,Frequency modulation–Narrowband frequency modulation (NBFM)and Wideband FM (WBFM), Generation of FM waves– direct, indirect method,Demodulation of FM, Phase modulation, Band pass limiter, Pre-emphasis&De-emphasis filters, FM receiver, FM Capture Effect, Problems.		
Unit – III	**NOISE IN COMMUNICATION SYSTEMS**	**Lecture hours:14**
Introduction, types of noise, Narrowband noise– Time domain representation and		

Quadraturerepresentation,Filtered white noise,Signal to noise ratio, Noise equivalent bandwidth, Effective noise temperature and Noisefigure.Performance analysis of AM,FM and PM in the presence of noise, Problems.		
Unit – IV	**ANALOG PULSE MODULATION SCHEMES**	**Lecture hours:12**
Natural sampling, Flat top sampling, Pulse amplitude modulation & demodulation, Pulse-Time Modulation–Pulse Duration and Pulse Position modulationsand demodulation schemes, PPM spectral analysis, Problems.		
Unit – V	**INFORMATION THEORY**	**Lecture hours:12**
Information content of message, Entropy, Entropy of symbols in long independent and dependentsequences, Properties of entropy,Information rate,Shannon's encoding algorithm, Discrete communication channels, Rate of information overa discrete channel, Capacity of discrete memorylesschannels, Discrete channels with memory, Shannon– Hartley theorem, Probability of error,Problems.		

Text Books:	
1	Simon Haykin, "Communication Systems",Wiley-India edition, 3rd edition, 2010.
2	B. P. Lathi, "Modern DigitalandAnalogCommunication Systems," Oxford Univ.press, 3 Edition, 2006.
References:	
1	A. Bruce Carlson, &Paul B. Crilly, "Communication Systems– An Introduction to Signals &Noise in Electrical Communication", McGraw-Hill International Edition,5th Edition, 2010.
2	Sham Shanmugam, "Digitaland Analog Communication Systems", Wiley-India edition,2006.
3	Kennedy .Davis " Electronic Communication Systems" 4th Edition,TATA McGraw-Hill

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**ELECTROMAGNETICS AND TRANSMISSION LINES**			
Branch for which this course is offered	**IV Semester (ECE)**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview
This course provides the foundational education in static electromagnetic fields, and time varying electromagnetic waves and provideanalytical skills for understanding propagation of electromagnetic waves in different media. Understand the concept of transmission lines & their applications.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	State Coulomb's law and Gauss's law based on electrostatic fields and write the Maxwell's equations.
CO2	ExplainAmpere's law in magneto static fields and write the Maxwell's equations.
CO3	Explain the Faraday's law and understand the four Maxwell's equations for time-varying fields
CO4	Apply the Maxwell's equations and analyze the reflection and refraction of electromagnetic waves propagated in normal and oblique incidences
CO5	Understand the properties of different types of transmission lines
CO6	Understand how to treat the transmission lines as circuit elements possessing complex impedances that are functions of line length and frequency

Course Content:		
Unit-I	**ELECTROSTATICS:**	**Lecture hours:12**
Vector Analysis, Co-ordinate systemsand their conversions, Coulomb's Law and Electric Field Intensity, Charge Distributions, Field due to a line, surface and volume charge Distributions, Sketches of Fields, Electric Flux Density, Gauss's Law, Applications of Gauss's Law,Divergence Theorem, Maxwell's Two Equations for Electrostatic Fields, Electric dipole, Energy Density, Practice Problems. **Conductors, Dielecrics and Capacitance:**Current and Current Density, Nature of Dielectric materials, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Several Capacitance Examples, Capacitance of a Two- Wire line, Practice Problems.		
Unit – II	**MAGNETOSTATICS:**	**Lecture hours:10**
Biot-Savart Law and Magnetic Field Intensity, Ampere's Circuital Law, Applications of Ampere's Law, Stokes' Theorem, Magnetic Flux and Magnetic Flux Density, Maxwell's Two Equations for steady Magnetic Field, Scalar and Vector Magnetic Potentials. Forces on a moving charge, Differential current element, Force between Differential current elements,Force and Torque on a closed circuit, Magnetic dipole, Inductances and Magnetic Energy, Practice Problems.		
Unit – III	**TIME-VARYING FIELDS AND MAXWELL'S**	**Lecture hours:10**

	EQUATIONS:	
Faraday's Law and Transformer e.m.f, Contradiction of Ampere's Law and Displacement Current Density, Maxwell's Equations in Point Forms and Integral Form and Word Statements, Practice Problems. **Boundary Conditions:**Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric, Dielectric-Conductor and Conductor-Freespace Interfaces, Practice Problems.		
Unit – IV	**UNIFORM PLANE WAVES:**	**Lecture hours:8**
Uniform Plane Waves – Definition, Wave Equations for Conducting and Perfect Dielectric Media, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Practice Problems. **Plane Waves at Boundaries:**Polarization,Reflection of uniform plane waves at Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance,Poynting Vector, and Poynting'sTheorem – Applications, Power Loss in a Plane Conductor, Practice Problems.		
Unit – V	**TRANSMISSION LINES:**	**Lecture hours:08**
Types, Transmission line parameters (Primary and Secondary), Transmission line equations, Input impedance, Reflection Coefficient, Standing wave ratio & power, Smith chart & its applications, Applications of transmission lines of various lengths.Micro-strip transmission lines – input impedance, Effective Dielectric Constant, Practice Problems.		

Text Books:	
1	Matthew N.O. Sadiku, "Elements of Electromagnetics," Oxford Univ. Press, 4th ed.
2	William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics," TMH, 7th ed., 2006.
References:	
1	Henry Stark, John W. Woods, "Probability and Random Processes with Application to Signal Processing", Pearson Education, 3rd Edition.
2	Electromagnetics – John D. Krauss, McGraw- Hill publications, 3rd ed.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**CONTROL SYSTEMS**			
Branch for which this course is offered	**IV Semester (EEE & ECE)**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview:
The primary objective of this course is to introduce the principles and concepts of control systems .The course deals with the basic concepts of block diagram reduction, transfer function representation of DC and AC servomotor, time domain analysis solutions to time invariant systems. The course also deals with the different aspects of stability analysis of systems in frequency domain and time domain, control design techniques with their operations, analysis of continuous systems and applications.

Course Outcomes:	
After Successful Completion of this course, the student will able to	
CO1	Differentiate the open loop and closed loop control system along with understanding of fundamental concepts like signal flow graph and Masons gain formula and also representing the transfer function of AC and DC servomotor.
CO2	Analyze the time response of both first order and second order systems along with the designing of various controllers
CO3	Apply the concepts of stability through Root locus technique, R-H Criterion in s-domain
CO4	Plot the phase and magnitude of various systems employing Bode plot, Nyquist plot and polar plot
CO5	Design compensation techniques which involve lag, lead and lead-lag type.
CO6	Derive the State models from schematic models along with diagnolization and formulation of state transition matrix

Course Content:			
Unit - I	**MODELING OF PHYSICAL SYSTEMS**	**Lecture Hours:**	**10**
Types of control systems- Examples-Comparisons- characteristics of feedback systems, Mathematical modeling and differential equations of physical systems, concept of transfer function, translational and rotational mechanical systems, electrical systems, force, voltage and			

force, current analogy.			
Unit - II	**BLOCK DIAGRAM REDUCTION TECHNIQUES AND TIME RESPONSE ANALYSIS**	**Lecture Hours:**	**12**
Block diagram representation of various systems - Signal flow graph, Mason's gain formula. Transfer Function of DC Servo motor - Characteristics of AC Servo motor - Synchro transmitter and Receiver. Time response analysis: Standard test signals, shifted unit step, impulse response, unit step response of first and second order systems, time response specifications, steady state errors and error constants, dynamic error coefficients method, Effects of proportional, derivative and proportional derivative, proportional integral and PID controllers.			
Unit – III	**CONCEPT OF STABILITY AND ROOT LOCUS TECHNIQUE**	**Lecture Hours:**	**12**
Introduction to stability Necessary and sufficient conditions for stability, Routh's and Routh Hurwitz stability criterions and limitations. Root locus technique: Introduction, root locus concept, construction of root loci, graphical determination of 'k' for specified damping ratio, relative stability, effect of adding zeros and poles on stability.			
Unit – IV	**FREQUENCY DOMAIN ANALYSIS AND COMPENSATORS**	**Lecture Hours:**	**10**
Frequency domain analysis: Introduction, frequency domain specifications, stability analysis from Bode plot, Nyquist plot, calculation of gain margin and phase margin, determination of transfer function, correlation between time and frequency responses Compensators: Lag, lead, lead - lag networks.			
Unit – V	**STATE SPACE ANALYSIS**	**Lecture Hours:**	**12**
State Space Analysis: Concept of state, state variables and state model, derivation of state models from block diagrams, diagonalization, solving the time invariant state equations, state transition matrix and properties, concept of controllability and observability			

Text Books:	
1.	Automatic Control Systems– by B. C. Kuo and FaridGolnaraghi – John wiley and son's, 8th edition, 2003.
2.	Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.

References :	
1.	Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2.	Control Systems Engineering - by NISE 5th Edition – John wiley.
3.	"Modelling& Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers.
4.	Modern Control Engineering – by Yaduvir Singh and S. Janardhan, CENGAGE Learning.
5.	Control Systems – A. Anand Kumar, Prentice Hall of India Pvt. Ltd.,

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**ELECTRICAL TECHNOLOGY**			
Branch for which this course is offered	**IV Semester (ECE)**	**L**	**T**	**C**
		3	**0**	**3**

Course Overview:
The primary objective of this course is to introduce the concepts of basic laws related to various electrical machines which review their applications in industries. The course deals with the constructional details and operation of DC and AC machines under no load and full load conditions and also their performance by conducting various tests. The operating principles and characteristics of DC and AC machines are also discussed that would give desired performance depending on application which would in turn give scope for research and development.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	State and define the basic laws related to operating principle of DC and AC machines, and Classify the types based on its applications.
CO2	Analyze the constructional details and principle of operation of DC machines and also depict their characteristics.
CO3	Implement the concept of speed control of DC motors along with evaluation of efficiency.
CO4	Compute the equivalent circuit parameters of single phase transformer and conduct the tests to determine the efficiency and regulation.
CO5	Analyze the constructional parts and principle of operation of AC machines with their characteristics. Apply the method employed in determination of voltage regulation of an alternator.

Course Content:			
Unit - I	**DC GENERATORS**	**Lecture Hours:**	**12**
D.C. Generators – Operational Principle – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited			

Generators – VoltageBuild Up - Critical Field Resistance and Critical Speed –Generator Characteristics- Applications			
Unit - II	***1.1. D.C. MOTORS***	**Lecture Hours:**	**12**
D.C Motors – Operational Principle – Back E.M.F.–Torque Equation – Motor Characteristics and its applications-Speed Control techniques of D.C. Motors. Three Point Starter- losses – Calculation of Efficiency - Swinburne's Test.			
Unit - III	**SINGLE PHASE TRANSFORMERS**	**Lecture Hours:**	**12**
Single Phase Transformers - Constructional Details- Emf Equation - Operation on No Load and on Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency-Regulation-OC and SC Tests – Sumpner's Test - Predetermination of Efficiency and Regulation.			
Unit - IV	**POLY PHASE INDUCTION MOTORS**	**Lecture Hours:**	**12**
Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines- - Principle of Operation – Slip- Rotor Emf and Rotor Frequency - Torque Equation- Torque Slip Characteristics.			
Unit - V	**SYNCHRONOUS MOTORS**	**Lecture Hours:**	**12**
Principle And Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Voltage Regulation by EMF Method- Theory of Operation of Synchronous Motor.			

Text Books:	
1	Electric Machines –by I.J.Nagrath&D.P.Kothari,TataMcGraw Hill, 7th Edition.2005
2	Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.
References :	
1	Electrical and Electronic Technology, Hughes, Pearson Education.
2	Principle of Electrical Engineering, V.K.Mehta, Rohit Mehta, S.Chand Publications.
3	Electrical Machines, P. S. Bimbhra, Khanna Publishers, 2011.
4	Basic Electrical Engineering, 2nd Edition, V.N. Mittle and Aravind Mittal, McGraw hill Education, 2006.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**ELECTRONIC CIRCUIT ANALYSIS LABORATORY**			
Branch for which this course is offered	**III Semester (ECE)**	**L**	**P**	**C**
		0	**3**	**1.5**

Course Overview:
This Lab provides the students to design the electronic circuit and they have to perform the analysis through simulator using Multisim/Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory**.**

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Analyze and design multistage amplifiers at low, mid and high frequencies.
CO2	Find the gain of feedback amplifiers.
CO3	Design RC and LC oscillators.
CO4	Determine the efficiencies of power amplifiers.
CO5	Draw the frequency response of tuned amplifiers.
CO6	Able to Analyze all the circuits using simulation software and Hardware.

Course Content:		
Exp – 1	CE Amplifier	**No. of Hours: 3**
Exp – 2	CC Amplifier	**No. of Hours: 3**
Exp – 3	Two Stage RC Coupled Amplifier	**No. of Hours: 3**
Exp – 4	Darlington Pair Amplifier	**No. of Hours: 3**
Exp – 5	Voltage-Series Feedback Amplifier	**No. of Hours: 3**
Exp – 6	Current-Shunt Feedback Amplifier	**No. of Hours: 3**
Exp – 7	RC Phase Shift Oscillator	**No. of Hours: 3**
Exp – 8	Hartley/Colpitt's Oscillator	**No. of Hours: 3**
Exp – 9	Class A Series-fed Power Amplifier	**No. of Hours: 3**
Exp – 10	Complementary Symmetry Class B Push-Pull Power Amplifier	**No. of Hours: 3**
Exp – 11	Single Tuned Amplifier	**No. of Hours: 3**

Exp – 12	Double Tuned Amplifier	**No. of Hours: 3**

Text Books:	
1	J. Millman, C. Halkias, "Electronic Devices and Circuits", TMH, 4th Edition, 2010.
2	R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications, 9th Edition, 2006.
Reference Books:	
1	Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.
2	Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition.
3	David A.Bell, "Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2009.
4	J.B.Gupta, "Electronic Devices and Circuits", 3rd Edition, S.K.Kataria& Sons, 2008.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course	**ANALOG COMMUNICATION SYSTEMS LABORATORY**			
Branch for which this course is offered	**IVSemester (ECE)**	**L**	**P**	**C**
		0	**3**	**1.5**

Course Overview:
This Lab provides the students to experience real time behavior of different analog modulation schemes .Technically visualize spectra of different analog modulation schemes.Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.Measure characteristics of radio receiver and antenna measurements.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Design different types of modulators and demodulators for analog continuous wave modulation.
CO2	Design FM modulator and demodulator
CO3	Design Phase Locked Loop
CO4	Study the characteristics of a mixer
CO5	Design pre-emphasis and de-emphasis circuits
CO6	Design different types of modulators and demodulators for analog pulse modulation.

Course Content:		
Exp – 1	Amplitude modulation and demodulation	**No. of Hours: 3**
Exp – 2	DSB-SC modulation and demodulation	**No. of Hours: 3**
Exp – 3	SSB-SC modulation and demodulation	**No. of Hours: 3**
Exp – 4	Frequency modulation and demodulation.	**No. of Hours: 3**
Exp – 5	Phase Locked Loop (PLL)	**No. of Hours: 3**
Exp – 6	Characteristics of Mixer.	**No. of Hours: 3**
Exp – 7	Pre-emphasis & de-emphasis.	**No. of Hours: 3**
Exp – 8	Pulse amplitude modulation & demodulation.	**No. of Hours: 3**
Exp – 9	Pulse width modulation & demodulation	**No. of Hours: 3**
Exp – 10	Pulse position modulation & demodulation.	**No. of Hours: 3**

Text Books:	
1	B. P. Lathi, “Modern DigitalandAnalog Communication Systems,” Oxford Univ.press, 3 Edition, 2006.

2	Sham Shanmugam, “Digitaland Analog Communication Systems”, Wiley-India edition,2006.
References:	
1	A. Bruce Carlson, &Paul B. Crilly, “Communication Systems– An Introduction to Signals &Noise in Electrical Communication”, McGraw-Hill International Edition,5th Edition, 2010.
2	Simon Haykin, “Communication Systems”,Wiley-India edition, 3rd edition, 2010.
3	Herbert Taub&Donald L Schilling, “Principles of Communication Systems”,TataMcGraw-Hill,3rd Edition,2009.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course	**ELECTRICAL TECHNOLOGY LAB**			
Branch for which this course is offered	**IV Semester (ECE)**	**L**	**T**	**C**
		0	**2**	**1**

Course Overview:
This course introduces the basic operational concepts of Electrical machines which gives thorough knowledge on DC Generators, DC Motors, Transformers, Induction Motors and Alternators. The performance aspects of electrical machines will be studied which are widely used in industrial applications.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Conduct experiments to obtain the no load and load characteristics of Dc Generators and Identify the reason as to why DC Generator is not building up voltage.
CO2	Conduct test on DC Motors for Predetermination of efficiency.
CO3	Control the speed of DC Motor in a given range using appropriate method.
CO4	Compute the Performance of Single Phase Transformer along with its equivalent circuit parameters.
CO5	Acquire good practical knowledge about the operation , testing and characteristics of A.C equipment like Induction Motors and Alternators

List of Experiments:

1. Magnetization Characteristics of DC Shunt Generator. Determination of Critical Field Resistance.
2. Load test on DC Shunt Generator. Determination of Performance Characteristics.
3. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine working as Motor and Generator).
4. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
5. Speed control of DC Shunt Motor
6. Brake Test on DC Compound Motor. Determination of Performance Characteristics
7. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at given Power Factors and Determination of Equivalent Circuit).
8. Load Test on Dc Compound Generator. Determination of Characteristics.
9. Separation of Core Losses of Single Phase Transformer

10. Sumpner's Test on a Pair of Identical Single Phase Transformers
11. Brake Test on Three Phase Induction Motor
12. Regulation of Alternator by Synchronous Impedance Method

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course	**QUANTITATIVE APTITUDE-1**			
Branch for which this course is offered	**IV Semester**	**L**	**T**	**C**
		1	**0**	**1**

Course Content:		
Unit – I	**RATIO AND PROPORTION AND AVERAGE, MIXTURES AND ALLEGATION**	Lecture Hours: 15
Ratio and Proportion: Ratio, Proportion, Variations, Problems on Ages **Average, Mixtures and Allegation**: Averages, Weighted average, Difference between mixture and allegation, Problems on Mixtures and allegation		
Unit – II	**PERCENTAGES,SI& CI, DATA INTERPRETATION**	Lecture Hours: 14
Percentages,SI& CI: Fundamentals of Percentage,Percentage change, SI and CI,Relation between SI, CI **Data Interpretation:** Introduction,Tabulation, Bar Graph, Pie Charts, Line Graphs,Combined Graphs.		
Unit – III	**PROFIT AND LOSS, PARTNERSHIPS, LOGARITHMS**	Lecture Hours: 14
Profit and loss, Partnerships: Basic terminology in profit and loss, Types of partnership, Problems related to partnership **Logarithms:** Fundamental formulae of logarithms and problems, finding no of terms on expanding a given number.		
Unit – IV	**PERMUTATION AND COMBINATION**	Lecture Hours: 14
Permutation and combination: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to numbers, Circular permutation, Combination		
Unit – V	**CLOCKS AND CALENDAR**	Lecture Hours: 14
Clocks: Introduction, Finding angle between hands of clock, Gain/Loss of Time, Finding time, Gain or loss of time **Calendar:** Calendars method- 1,Calendars method -2		

Text Books:	
1	Quantitative Aptitude for competitive examinations by R.SAggarwal
2	Quantitative Aptitude for competitive examinations by AbhijitGuha
3	The Pearson guide to Quantitative Aptitude by Dinesh Khattar

COURSE STRUCTURE

V - SEMESTER

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

V SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1701	Managerial Economics and Financial Analysis	HS	3	0	0	3	30	70	100
A1418	Antennas and Wave Propagation	PC	3	0	0	3	30	70	100
A1419	Digital Communication Systems	PC	3	0	0	3	30	70	100
A1420	Linear Integrated Circuit Applications	PC	3	0	0	3	30	70	100
	Professional Elective – 1	PE	3	0	0	3	30	70	100
	Open Elective – 1	OE	3	0	0	3	30	70	100
A1421	Digital Design through Verilog HDL Laboratory	PC	0	0	4	2	30	70	100
A1422	Digital Communication Systems Laboratory	PC	0	0	3	1.5	30	70	100
A1423	Linear Integrated Circuit Applications Laboratory	PC	0	0	3	1.5	30	70	100
A1016	Advanced English Language Communication Skills	MC	2	0	0	0	100*	-	100*
		TOTAL	20	00	10	23	270	630	900

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1701 – 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	30	70	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

There are no prerequisites and corequisites for this course.

2. Course Outcomes (COs)

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

A1701.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization

A1701.2 Analyze the demand, production, cost and break even to know interrelationship among variables and their impact

A1701.3 Classify the market structure to decide the fixation of suitable price

A1701.4 Apply capital budgeting techniques to select best investment opportunity

A1701.5 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 Isocosts, 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, pearsoneducation, New Delhi, 2011.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1418 – ANTENNAS AND WAVE PROPAGATION

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

Antenna is a key element in establishment of an efficient wireless communication between two points. So, the study of a course exclusively on antennas along with radio wave propagation is essential for Electronics and Communication Engineering graduates. This course covers antenna parameters, construction and design specifications of different antennas and antenna arrays used for VHF, UHF and microwave applications. This course also delivers knowledge on radio wave propagation in different atmosphere layers. The knowledge provided by this course will be useful in understanding and design of practical antennas.

Course Pre/corequisite

A1410 – Electromagnetics and Transmission Lines

2. Course Outcomes (COs)

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

A1418.1 Compare the performance of different antennas using antenna parameters

A1418.2 Analyze dipole and array antennas by computing fields, radiated power and radiationresistance

A1418.3 Select appropriate antenna for a specific application like TV, AM/FM radio, radar, satellite link

A1418.4 Design horn, helical and reflector antennas for VHF, UHF and microwave communication applications

A1418.5 Formulate the design equations of microstrip antennas for a given application

3. Course Syllabus

UNIT-I

Antenna Basics: Introduction, radiation mechanism, basic antenna parameters.

Dipole antennas: Radiation from small electric dipole, quarter wave monopole and half-wave dipole–Current distributions, field components, radiated power, radiation resistance.

UNIT-II

Helical antennas: Helical geometry, helix modes, practical design considerations for monoflair helical antenna in axial and normal modes.

Horn antennas: Types, Fermat's principle, optimum horns, design considerations of pyramidal horns.

UNIT-III

Reflector antennas: Introduction, flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, feed methods.

Microstrip antennas: Rectangular patch antenna- Geometry and parameters, characteristics of microstrip antennas, Impact of different parameters on characteristics

UNIT-IV

Antenna arrays: Array of 2 isotropic sources- Different cases, principle of pattern multiplication, uniform linear arrays – Broadside arrays, endfire arrays, bionomial array.

UNIT-V

Ground wave propagation: Introduction, plane earth reflections, space and surface waves, wave tilt, curved earth reflections

Space wave propagation: Introduction, field strength variation with distance and height, effect of earth's curvature, M-curves and duct propagation.

Sky wave propagation: Introduction, structure of ionosphere, refraction and reflection of sky waves by ionosphere, critical frequency, MUF, virtual height and skip distance, relation between MUF and skip distance.

4. Books and Materials

Text Book(s)

1. John D. Kraus, Ronald J. Marhefka and Ahmad S.Khan, *Antennas and wave propagation*, TMH, New Delhi, 4th edition (special Indian edition), 2010.

Reference Book(s)

1. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems,* PHI, 2nd edition, 2000.
2. C.A. Balanis, *Antenna Theory- Analysis and Design,* John Wiley & Sons, 2nd edn., 2001.
3. K.D. Prasad, Satya Prakashan, *Antennas and Wave Propagation,* Tech. India Publications, New Delhi, 2001.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1419 – DIGITAL COMMUNICATION SYSTEMS

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

1. Course Description

Course Overview

The aim of this course is to provide students with an in-depth knowledge on sampling, quantizing and coding to convert analog signals in to digital form. This course covers various analog to digital conversion techniques like PCM, DM along with the refined forms like DPCM and ADM. In addition to baseband transmission of digital data over the channel, carrier modulation schemes like ASK, FSK, PSK, DPSK and QPSK are also covered. Students will also be able to analyze different channel coding methods.

Course Pre/corequisites

A1409 – Analog Communication Systems

2. Course Outcomes (COs)

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

A1419.1 Analyze different digital modulation techniques to convert analog signals to digital form.

A1419.2 Distinguish between baseband and passband transmission techniques in terms of SNR and BER.

A1419.3 Examine the concepts of geometric representation of signals and constellation diagrams.

A1419.4 Compare digital carrier modulation schemes in terms of bandwidth, complexity and spectral efficiency.

A1419.5 Interpret the differences between linear block codes and convolutional codes for noisy and noiseless channels.

3. Course Syllabus

UNIT-I

Source Coding Systems: Introduction, encoding and decoding of pulse code modulation, delta modulation, differential PCM, adaptive DPCM, noise in PCM systems, time division multiplexing.

UNIT-II

Baseband Pulse Transmission: Introduction, inter-symbol interference, raised cosine filter, matched filter, correlative coding – duo binary &modified duo binary signaling schemes, baseband M-array PAM transmission, Eye diagrams.

UNIT-III

Signal Space Analysis: Introduction, Geometric representation of signals, gram schmidt orthogonalization, coherent detection, correlation receiver, matched filter receiver, probability of error, signal constellation diagram.

UNIT-IV

Passband Data Transmission: Introduction, power spectra, error probability and generation and detection of coherent – BPSK, QPSK, BFSK, M-array PSK, M-array QAM, generation and detection of non-coherent BFSK, DPSK.

UNIT-V

Channel Coding: Error detection & correction, hamming distance, linear block codes, convolutional codes.

4. Books and Materials

Text Book(s)

1. Simon Haykin, *Communication Systems,* wiley India, 4th edition, 2011.
2. Sam shanmugam, *Digital and Analog Communication Systems,* John Wiley, 2005.

Reference Book(s)

1. B.P.Lathi and Zhi Ding, *Modern Digital & Analog Communication Systems*, Oxford University Press, International 4th edition, 2010.
2. Bruce Carlson and Paul B Crilly, Communication Systems – *An introduction to Signals & Noise in Electrical Communication*, Mc Graw-Hill International, 5th edition, 2010.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1420 – LINEAR INTEGRATED CIRCUIT APPLICATIONS

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

1.Course Description

Course Overview

This course deals with linear and non-linear applications of operational amplifier. It covers the design and analysis of frequency selective and tuning circuits like oscillators, active filters, PLL and their use in communication applications. This course deals with analog to digital and digital to analog conversion techniques and provides the complete knowledge of linear and non-linear applications of integrated circuits.

Course Pre/corequisites

1. A1201 – Network Analysis
2. A1401 – Electronic Devices and Circuits
3. A1409 – Electronic Circuit Analysis

2. Course Outcomes (COs)

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

A1420.1 Analyze the characteristics of operational amplifier.

A1420.2 Design different amplifier and oscillator circuits using op-amp.

A1420.3 Make use of IC 555 and PLL effectively in communication systems.

A1420.4 Construct different active filters using op-amp.

A1420.5 Design different analog to digital and digital to analog converters effectively.

3. Course Syllabus

UNIT-I

Operational amplifiers: Differential amplifier configurations, balanced and unbalanced output differential amplifiers, current mirror, level translator, introduction to operational amplifier, block diagram, ideal op-amp, equivalent circuit, voltage transfer curve, open loop op-amp configurations.

UNIT-II

Feedback configurations: voltage series feedback, voltage shunt feedback and differential amplifiers, properties of practical op-amp, compensating networks, open loop and closed loop frequency responses, circuit stability, slew rate.

Linear applications of op-amps: peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator.

UNIT-III

Active filters and Oscillators: First, second and third order Butterworth filter and its frequency response, phase shift and Wien bridge oscillators, square, triangular and saw-tooth wave generators, comparators, zero crossing detector, schmitt trigger.

UNIT-IV

Timers and PLL: Introduction to IC 555 timer, functional diagram, monostable, astable operations and applications, introduction to PLL, block schematic, principles and description of individual blocks, applications of PLL.

UNIT-V

Data converters: Specifications of analog to digital converters, weighted resistor and R-2R ladder converter type A/D converters, specifications of digital to analog converters, flash, successive approximation, single slope and dual Slope type D/A converters.

4. Books and Materials

Text Book(s)

1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 2nd edition, 2003. Education, 2007.

Reference Book(s)

1. Ramakanth A. Gayakwad, *Op-Amps and Linear ICs*, PHI, 4th edition, 1987.
2. David A. Bell, *Operational Amplifiers & Linear ICs*, Oxford University Press, 2nd edition, 2010.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1421 – DIGITAL DESIGN THROUGH VERILOG HDL LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	4	0	0	56	2	30	70	100

1. Course Description

Course Overview

This laboratory course introduces Verilog HDL, a hardware description language for the design, synthesis, simulation and verification of VLSI circuits. Verilog HDL is an IEEE standard that is used by the engineers to efficiently design and analyse complex digital designs. This course covers the various modelling styles like data flow, structural, behavioural and switch level modelling. This course also provides knowledge on developing test benches to verify the functionality of combinational and sequential logic designs. The knowledge acquired in this course is used to develop complex digital applications using suitable EDA tools.

Course Pre/corequisites

1402 – Digital Logic Design

2. Course Outcomes (COs)

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

A1421.1 Develop hardware digital designs using Verilog HDL

A1421.2 Use various modeling styles appropriately for digital design

A1421.3 Design, simulate and synthesize combinational circuits using Verilog descriptions

A1421.4 Design, simulate and synthesize sequential circuits using Verilog descriptions

A1421.5 Use finite state machines to design complex circuits

3. Course Syllabus

PART – A:

Introduction to Verilog: Evolution of HDLs, typical HDL-based design flow.

Language constructs: Lexical conventions, data types, system tasks and compiler directives, module definition, port declaration, connecting ports, hierarchical name referencing, test bench.

Gate-Level Modeling: Gate primitives and delays.

Data-flow Modeling: Continuous assignments, delay specification, expressions, operators and operands.

Behavioral Modeling: Structured procedures, initial and always, blocking and non-blocking statements, delay control, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.

Switch-Level Modeling: Switch modeling elements, delay specification on switches, examples. **Tasks, Functions and UDPs:** Differences between tasks and functions, declaration, combinational and sequential UDPs.

PART-B:

1. Introduction to EDA tool (Cadence Incisive/Xilinx ISE design suite).
2. Develop Verilog HDL code of logic gates in data flow & Gate level styles.
3. Write a Verilog HDL code to describe the function of Full adder and Full subtractor.
4. Develop a Verilog HDL code for Ripple carry adder.
5. Write a Verilog HDL program for a) Multiplexers b) Decoders c) Priority encoder.
6. Write a Verilog HDL code for code converters (binary to gray, gray to binary, bcd to seven segment and etc.).
7. Write a Verilog HDL code to describe Magnitude comparators.
8. Write a Verilog HDL program for ALU by mentioning operations.
9. Write a Verilog HDL code for all logic gates using switch level modelling.
10. Develop a Verilog HDL code for the flip-flops - D, T, SR, JK.
11. Develop a Verilog HDL code for the Shift registers and counters using behavioural modelling.
12. Design and simulate the Verilog HDL code for sequence detector using FSM Moore & Mealy machine.

4. Laboratory Equipment/Software/Tools Required

1. Computers installed with operating system.
2. Cadence Incisive/Xilinx ISE design suite

5. Books and Materials

Text Book(s)

1. Samir Palnitkar, *Verilog HDL: A Guide to Digital Design and Synthesis*, 2nd Edition, 2003.
2. T.R Padmanabhan & B Bala Tripura Sundari, *Design through Verilog HDL*, WSE, IECE Press, 2004.

Reference Book(s)

1. J Bhasker, *A Verilog HDL Primer*, BSP, 2003.
2. Stephen Brown & Zvonko Vranesic, *Fundamentals of Logic Design with Verilog design*, TMH, 2nd edition, 2010.
3. Michael D Ciletti,*Advanced Digital Design with Verilog HDL*, PHI, 2005.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1422 – DIGITAL COMMUNICATION 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	30	70	100

1. Course Description

Course Overview

This laboratory course provides the students to experience real time behavior of different digital modulation schemes and technically visualize spectra of different digital modulation schemes. In this course students will be able to analyze practical behavior of different elements available in digital communication system such as filters and amplifiers.

Course Pre/corequisites

A1419 – Digital Communication Systems

2.Course Outcomes (COs)

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

A1422.1 Demonstrate the working of various digital modulation and demodulation schemes.

A1422.2 Design various digital modulation schemes to obtain desired modulation index.

A1422.3 Analyze the performance of time division multiplexing and demultiplexing.

A1422.4 Study and verify sampling theorem.

A1422.5 Verify digital modulation techniques using MATLAB.

3. Course Syllabus

Hardware & Software (MATLAB)

1. Sampling theorem
2. Time division multiplexing and demultiplexing
3. Pulse code modulation and demodulation
4. Differential pulse code modulation and demodulation
5. Delta modulation and demodulation
6. Amplitude shift keying
7. Frequency shift keying
8. Phase shift keying
9. Quadrature phase shift keying

4. Laboratory Equipment/Software/Tools Required

1. Trainer Kits
2. Computers with latest MATLAB software
3. Digital storage oscilloscopes

5. Books and Materials

Reference Book(s)

1. Simon Haykin, Communication Systems, Wiley India edition, 4th edition, 2011.

Links

1. https://www.gphisar.ac.in/downloads/files/n5d60af42a3532.pdf

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1423 – LINEAR INTEGRATED CIRCUIT APPLICATIONS 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 course deals with the design and applications of operational amplifier and other analog integrated circuits. More focus is given to the implementation of op-amp configurations, linear and nonlinear applications of op-amps and active filter synthesis. It also deals with implementation of oscillators, waveform generators, data converters and the concepts of specialized ICs like 555 timer and 565 PLL.

Course Pre/corequisites

1. A1405 – Electronic Devices and Circuits Laboratory
2. A1411 – Electronic Circuit Analysis Laboratory
3. A1420 – Linear Integrated Circuit Applications

2. Course Outcomes (COs)

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

A1423.1 Implement different configurations of operational amplifiers.

A1423.2 Generate various shapes of signals using op-amps and timers.

A1423.3 Construct and analyse various active filters and data converters using op-amp.

A1423.4 Analyze the characteristics and applications of PLL.

3. Course Syllabus

1. Construct and test the performance of

a) Unity gain amplifier

b) Non – Inverting amplifier

c) Inverting amplifier

2. Analyze how op-amp can be used as Adder and Subtractor.

3. Study the characteristics of Comparator using op-amp.

4. Design of Astable multivibrator as a square wave generator.

5. Design and analyze the practical differentiator.

6. Design and analyze the practical integrator.

7. Construct a function generator to generate triangular and square wave signals.

8. Verify the characteristics of voltage controlled oscillator using IC 565.
9. Design and analyze the 1st and 2nd order low pass and high pass filters and plot the frequency responses.
10. Design and analyze the notch filter and plot the frequency response.
11. Design and verify the operation of instrumentation amplifier using op-amp.
12. Design and analyze R-2R ladder type Digital to Analog Converter using IC 741
13. Design adjustable duty cycle rectangular wave generator and frequency shift keying generator IC555 in astable mode of operation.

4. Laboratory Equipment/Software/Tools Required

1. Analog Discovery2 Kit with PC, USB Cable.
2. Analog IC's: TL082, 741C, 555 and 565.

5. Books and Materials

Text Book(s)

1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 2nd edition, 2003. Education,2007

Reference Book(s)

1. Ramakanth A. Gayakwad, *Op-Amps and Linear ICs*, PHI, 4th edition, 1987.
2. David A. Bell, *Operational Amplifiers & Linear ICs*, Oxford University Press, 2nd edition, 2010.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1016 – ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS

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

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication skills is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

Course Pre/corequisites

1. A1001- Functional English
2. A1006- English Language Communication Skills Lab
3. A1008- English for Professional Communication

2. Course Outcomes (COs)

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

A1016.1 Build inferences and predictions based on the information provided in the context.

A1016.2 Choose academic vocabulary appropriately both in speaking and in writing.

A1016.3 Develop effective technical writing skills.

A1016.4 Construct necessary skills to deliver presentation confidently for improving in respective domains.

A1016.5 Apply language structures to construct good relations.

3. Course Syllabus

UNIT I: Communication Skills:

1. Reading Comprehension –General and Technical
2. Listening Comprehension
3. Vocabulary Development
4. Common Errors

UNIT II: Writing Skills:

1. Technical Report writing
2. Resume Preparation
3. E-mail Writing

UNIT III: Presentation Skills:

1. Oral presentation
2. Power Point Presentation
3. Poster presentation

UNIT IV: Getting Ready For Job:

1. Debates
2. Group discussions
3. Job Interviews

UNIT V: Interpersonal Skills:

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes-Telephone and email etiquette

4.Books and Materials

Text Book(s):

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

Reference Book(s)

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.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

VI - SEMESTER

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

VI SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1425	Digital Signal Processing	PC	3	1	0	4	30	70	100
A1426	CMOS VLSI Design	PC	3	0	0	3	30	70	100
A1427	Microprocessors and Microcontrollers	PC	4	0	0	4	30	70	100
	Professional Elective – 2	PE	3	0	0	3	30	70	100
	Professional Elective – 3	PE	3	0	0	3	30	70	100
A1539	JAVA Programming Laboratory	PC	0	0	4	2	30	70	100
A1428	CMOS VLSI Design Laboratory	PC	0	0	3	1.5	30	70	100
A1429	Microprocessors and Microcontrollers Laboratory	PC	0	0	3	1.5	30	70	100
A1430	Comprehensive Assessment – II	PC	0	0	0	1	-	100	100
A1015	Human Values and Professional Ethics	MC	2	0	0	0	100*	-	100*
		TOTAL	18	01	10	23	240	660	900

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1425 – DIGITAL SIGNAL PROCESSING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	0	0	4	30	70	100

1. Course Description

Course Overview

This course presents the fundamental concepts, algorithms and applications of digital signal processing. This course investigates the processing and analysis of signals using the most common approaches and algorithms. This course also presents the designing of digital filters, realization of filters, multi rate signal processing and applications of multirate signal processing. This course provides the students an opportunity to design and realize different filters.

Course Pre/corequisites

A1403 – Signals and Systems

2. Course Outcomes (COs)

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

A1425.1 Apply the Discrete Fourier Transform to represent the signals in frequency domain.

A1425.2 Analyze various DFT algorithms and their applications.

A1425.3 Analyze various realization forms of FIR and IIR Filters.

A1425.4 Design digital FIR and IIR filters and analyse their performances.

A1425.5 Apply the concepts of multirate signal processing to implement digital filters.

3. Course Syllabus

UNIT-I

Discrete Fourier Transform: Introduction, relationship of the DFT to other transforms, properties of the DFT, use of the DFT in linear filtering.

UNIT-II

Fast Fourier Transform Algorithms: Direct computation of DFT, the fast fouriertransform, radix-2 FFT algorithms, radix-4 FFT algorithms, and split-radix FFT algorithms, applications of FFT algorithms.

UNIT-III

Realization of digital filters: Structures for FIR systems - direct form, cascade form, frequency sampling structures, structures for IIR systems – direct form, signal flow graphs &transposed, cascade form, parallel form and lattice structures.

UNIT-IV

Design of digital filters: Introduction , design of finite impulse response (FIR) filters-design of linear phase FIR filters using windows, frequency sampling method, design of infinite impulse response (IIR)

filters from analog filters – IIR filter design by approximation of derivatives, by impulse invariance, and by bilinear transformation methods.

UNIT-V

Multirate Signal Processing: Introduction, decimation, interpolation, sampling rate conversion by a rational factor, multistage implementation of sampling rate conversion, applications of multirate signal processing.

4. Books and Materials

Text Book(s)

1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing Principles, Algorithms and applications*, Pearson Education/ PHI, 4th edition.

Reference Book(s)

1. Monson H. Hayes, *Digital Signal Processing*, Schaum's Outlines, 2nd edition.
2. A.V.Oppenheim and R.W. Schaffer, & J R Buck, *Discrete Time Signal Processing*, 2nd ed., Pearson Education, 2012.
3. B.P. Lathi, *Principles of Signal Processing and Linear Systems*, Oxford Univ. Press, 2011.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1426 – CMOS VLSI DESIGN

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

1. Course Description

Course Overview

This is an introductory course which covers basic theories and techniques of digital VLSI design in CMOS technology. This course covers physics of MOS transistor, CMOS fabrication processes, DC and transient characteristics of CMOS inverter, static and dynamic CMOS logic circuits. The knowledge acquired in this course will enable the students to design CMOS VLSI circuits and systems utilizing modern IC design methodologies.

Course Pre/corequisites

A1402 – Digital Logic Design

2. Course Outcomes (COs)

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

A1426.1 Analyze the electrical properties of MOS transistors.

A1426.2 Apply various CMOS processing techniques to fabricate NMOS, PMOS and CMOS devices.

A1426.3 Analyze the DC and transient characteristics of CMOS logic gates.

A1426.4 Build logic circuits using transmission gate logic.

A1426.5 Make use of charge leakage and charge sharing concepts to design dynamic logic circuits.

3. Course Syllabus

UNIT-I

MOS Transistor: Introduction, MOS device design equations, threshold voltage, body effect, channel length modulation.

CMOS Processing Technology: Overview, wafer processing, oxidation, epitaxy, deposition, ion implantation and diffusion, the silicon gate process, NMOS, PMOS and CMOS fabrication technologies.

UNIT-II

CMOS Inverter: Basic circuit, noise margins, layout considerations, inverter switching characteristics, switching intervals, high-to-low time, low-to-high time, maximum switching frequency, transient effects on the VTC, RC modelling, propagation delay, inverter design– DC design, transient design, power dissipation.

UNIT-III

Static Logic Gates: Complex logic functions, CMOS NAND & NOR gates– DC characteristics, transient characteristics, complex logic gates, EX-OR and equivalence gates, adder circuits, SR and D type

Latch, CMOS SRAM cell, Schmitt trigger circuits, tri-state output circuits and pseudo-nMOS logic gates.

UNIT-IV

Transmission Gate Logic Circuits: Basic structure, TG as tri-state controller, electrical analysis– logic 1 transfer, logic 0 transfer, RC Modelling– TG resistance, TG capacitance, TG based switch logic gates– multiplexers, OR, XOR, TG adders, TG registers, the D-type Flip-Flop.

UNIT-V

Dynamic Logic Circuit Concepts: Charge leakage, charge sharing, the dynamic RAM cell, clocks and synchronization, clocked-CMOS and clock generation circuits.

4. Books and Materials

Text Book(s)

1. John P. Uyemura, *CMOS Logic Circuit Design*, Kluwer Academic Publishers, 2002.

Reference Book(s)

1. Douglas A Pucknell, Kamran Eshraghian, *Basic VLSI Design,* PHI, 3rd edition, 1995.
2. Neil H. E. Weste, Kamran Eshraghian, *Principles of CMOS VLSI Design – A System Perspective*, 2nd edition, Pearson Education Asia, 2001.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1427 – MICROPROCESSORS AND MICROCONTROLLERS

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	30	70	100

1. Course Description

Course Overview

This course introduces microprocessors, microcontrollers and their architectures. Focus is on 8086 microprocessor which includes internal architecture, pin diagram, instruction set, register organization, addressing modes, assembly language programming and etc. It also emphasizes on MSP430 microcontroller, on-chip peripherals and data communication protocols. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course will be useful to students as a first level course for embedded systems.

Course Pre/corequisites

A1402 - Digital Logic Design

2. Course Outcomes (COs)

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

A1427.1 Analyze 8086 microprocessor and MSP430 microcontroller architectures.

A1427.2 Develop programs using 8086 microprocessor and MSP430 microcontroller.

A1427.3 Make use of peripherals of MSP430 to interface I/O devices.

A1427.4 Apply serial communication protocols for interfacing serial devices.

A1427.5 Design embedded applications using MSP430 microcontroller.

3. Course Syllabus

UNIT-I

8086 Microprocessor: Introduction-8086 features, architecture, register organization, flag register, pin diagram, timing and control signals, system timing diagrams, memory segmentation, memory organization and memory banks accessing. Interrupt structure of 8086 and interrupt vector table.

UNIT-II

8086 Assembly Language Programming: Instruction formats -addressing modes-instruction set of 8086, assembler directives- macros and procedures - sorting, multiplication, division, multi-byte arithmetic, code conversion. String manipulation instructions-simple ALPs.

UNIT-III

MSP430 Microcontroller: Low power RISCMSP430 features, block diagram, MSP430G2X53–block diagram, memory address space, register set, addressingmodes, instruction set, on-chip peripherals (analog and digital).

UNIT-IV: MSP430 Peripherals: I/O ports and pull up/down resistors concepts, interrupts and interrupt programming, watchdog timer, system clocks, low power modes, active vs standby current consumption. Timer & real time clock, PWM control, ADC and comparator.

UNIT-V: 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)

1. A.K.Ray and Bhurchandi,*Advanced Microprocessors and Peripherals*, 3rd edition, TMH Publications
2. John H. Davies,*MSP430 microcontroller basics*, 1st edition, Newnes Publication, 2008.

Reference Book(s)

1. N. Senthil Kumar, M. Saravanan and S. Jeevanathan,*Microprocessor and Microcontrollers*, 1st edition, Oxford Publishers, 2010.
2. Lyla B. Das,*The X86 Microprocessors, Architecture, Programming and Interfacing*, Pearson Publications, 2010.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1539 – JAVA 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

Learn to use object orientation to solve problems and use java language to implement them. To experiment with the syntax and semantics of java language and gain experience with java programming.

Course Pre/corequisites

A1505 – Object oriented programming through JAVA

2. Course Outcomes (COs)

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

A1539.1 Apply of data types, variables and control structures to solve problems

A1539.2 Apply object-oriented concepts to solve problems including generating series primes, searching a pattern in a file.

A1539.3 Design, write, debug and execute applet programs using Integrated Development Environment.

A1539.4 Develop programs using threads and swing concepts.

A1539.5 Apply I/O stream and networking classes to develop client and server interaction.

A1539.6 Apply the concepts and create solution effectively as a member or leader in a team during the development of a software project.

3. Lab Experiments

1. Preparing and practice – Installation of Java software, study of any Integrated development environment, sample programs on operator precedence and associativity, class and package concept, scope concept, control structures, constructors and destructors. Learn to compile, debug and execute java programs.
2. a) Develop a java application for banking transactions by using inheritance concept.
   b) Develop a java application for Ticket Reservation by using the concept of Polymorphism.
3. a) Develop a java application for Daily Attendance by using the concept Dynamic Binding.
   b) Write a program for the following.
   c)Develop a swing program that displays a simple message.
   d)Develop a swing program for waving a Flag using Applets and Threads.
4. a) 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.

b) Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

5. a) Write Java program(s) on creating multiple threads, assigning priority to threads, synchronizing threads, suspend and resume threads

   b) 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.
6. 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.
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. a) Using swings design a simple calculator which performs all arithmetic operations. The interface should look like the calculator application of the operating system. Handle the exceptions if any.
9. Write a java program to handle mouse events
10. a) Write a java program to handle keyboard events

    b) Write a java program that allows conduction of object type examination containing multiple choice questions, and true/false questions. At the end of the examination when the user clicks a button the total marks have to be displayed in the form of the message.
11. a) Write a java program that creates menu which appears similar to the menu of notepad application of the Microsoft windows or any editor of your choice.

    b) Write a java program that creates dialog box which is similar to the save dialog box of the Microsoft windows or any word processor of your choice
12. a) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication

    b) Write a java program to find and replace pattern in a given file.
13. a) Use inheritance to create an exception super class called ExceptionA and exception sub classes ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC.

    b) Write a Java program which opens a connection to standard port on well-known server, sends the data using socket and prints the returned data.
14. a) Write a Java program which uses TCP/IP and Datagrams to communicate client and server.

    b) Create an interface for stack with push and pop operations. Implement the stack in two ways: fixed size stack and Dynamic stack (stack size is increased when stack is full).
15. a) Design a swings program for Hospital management system to maintain doctors and patients data and generate reports by using JDBC connectivity.

    b) Develop a swing program with menu bar for college management system. The program should establish connectivity with back end for data transactions; it should generate necessary reports as per requirements.

4. Laboratory Equipment/Software/Tools Required

1. java software

5. Books and Materials

Text Book(s)

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

Reference Book(s)

1. T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan,*Programming with Java,* Pearson Edition.
2. Herbert Schildt and Dale Skrien, *Java Fundamentals - A Comprehensive Introduction*, Special Indian Edition, McGrawHill, 2013.
3. Paul Deitel, Harvey Deitel,*Java – How to Program*, PHI.
4. NageswarRao, *Core Java*, Wiley Publishers.
5. Bruce Eckel, *Thinking in Java,* Pearson Education.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSESTRUCTURE
A1428 – CMOS VLSI Design 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 will provide design and implementation of CMOS digital VLSI circuits using Cadence / mentor graphics / synopsys / equivalent CAD tools. The design includes Gate-level design / transistor-level design / hierarchical design, simulation and verification. In this course students will study the characteristics of static, dynamic CMOS circuits and transmission gate circuits for different technologies. It also covers secondary effects such as temperature, power supply and process corners, circuit optimization with respect to area, extraction of parasitics, layout consumption, DC/transient analysis and verification of layouts.

Course Pre/corequisites

1. A1402 – Digital Logic Design
2. A1426 – CMOS VLSI Design

2. Course Outcomes (COs)

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

A1428.1 Construct the schematics and symbols of logic circuits using EDA tool.

A1428.2 Analyze the characteristics of CMOS logic circuits using suitable simulator.

A1428.3 Construct the layouts for complex CMOS logic circuits following DRC and ERC rules.

A1428.4 Analyze VLSI circuit timing to estimate and compute the leakage power consumption of a VLSI circuit.

A1428.5 Evaluate the performance of CMOS logic circuits in terms of power, speed and area.

3. Course Syllabus

1. Analyze CMOS inverter for its DC and transient characteristics.
2. Construct schematic and simulate static CMOS logic gates – NAND, NOR, AND, OR
3. Construct schematic and simulate static CMOS logic gates – EXOR and EXNOR
4. Design layouts for static logic gates – CMOS inverter, NAND, NOR, EXOR, EXNOR
5. Analyze CMOS 1- bit Full Adder
6. Analyze transmission gate based tri-state controller.
7. Design and Analyze Full Adder using transmission gates.
8. Design and Analyze Multiplexer using transmission gates.
9. Design and Analyze RL, RC and RLC Circuits.
10. Analyze NMOS and PMOS transistor characteristics.
11. Analyze Pseudo NMOS inverter characteristics.

12. Design and Analyze Pseudo NMOS NAND and NOR gates.

4. Laboratory Equipment/Software/Tools Required

1. Computers installed with operating system (Red Hat Linux).
2. Cadence Virtuoso Analog Design environment and other equivalent software.

5. Books and Materials

Text Books

1. John P. Uyemura, *CMOS Logic Circuit Design*, Kluwer Academic Publishers, 2002.

Other References:

Analog Lab Manual

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1429 – MICROPROCESSORS AND MICROCONTROLLERS 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 course provides the students with the knowledge of assembly language programming – arithmetic operations, logical operations, string operations, code conversion and sorting using Emu8086 Emulator. It also provides the knowledge of embedded C programming – GPIO ports, low power modes, interrupts, PWM and interfacing potentiometer using Code Composer Studio on MSP430 microcontroller.

Course Pre/Corequisites

1. A1402 – Digital Logic Design
2. A1427 – Microprocessors and Microcontrollers

2. Course Outcomes (COs)

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

A1429.1 Develop assembly language programs using EMU8086 emulator.

A1429.2 Execute 8086 ALPs for arithmetic, logical, string, call operations.

A1429.3 Build programs of MSP430 using embedded C.

A1429.4 Interface LEDs, push buttons, potentiometer to MSP430.

A1429.5 Test and debug 8086 ALPs and MSP430 embedded C programs.

3. Course Syllabus

PART A: List of Assembly Language Programs using 8086 Microprocessor

1. Programs using arithmetic and logical operations
2. Programs using string operations and Instruction prefix:Move block, reverse string, sorting, string comparison
3. Programs for code conversion
4. Multiplication and division programs
5. Sorting and multi byte arithmetic
6. Programs using CALL and RET instructions

PART – B: List of Embedded C Programs using MSP430 Microcontroller

1. Interfacing and programming GPIO ports in C using MSP430 (blinking LEDs , push buttons)
2. Usage of low power Modes: measure the active mode and standby mode current
3. Interrupt programming examples through GPIOs
4. PWM generation using Timer on MSP430 GPIO
5. Interfacing potentiometer with MSP430

6. PWM based Speed Control of Motor controlled by potentiometer connected to MSP430 GPIO
7. Using ULP advisor in Code Composer Studio on MSP430
8. Low Power modes and Energy trace++: Compute Total Energy, and Estimated lifetime of an AA battery.

4. Laboratory Equipment/Software/Tools Required

1. Computers installed with operating systems
2. 8086 Emulator software
3. Code Composer Studio Software
4. MSP430 G2 Launch Pad with USB Cable

5. Books and Materials

Reference Books

1. A.K.Ray and Bhurchandi,*Advanced Microprocessors and Peripherals*, 3rd edition, TMH Publications.
2. John H. Davies,*MSP430 microcontroller basics*, 1st edition, Newnes Publication, 2008.

Other References

1. https://www.tutorialspoint.com/assembly_programming/assembly_tutorial.pdfhttps://e2e.ti.com/cfs-file/__key/communityserver-wikis-components-files/00-00-00-02-51/Embedded-System-Design-using-MSP430-Launchpad-Development-Kit.pdf

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1015 – HUMAN VALUES ANDPROFESSIONAL ETHICS

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 has a significant role to play in the betterment of our society through ethics and values. It enables the student to understand the professional values and their role in personal life and professional life to transform individuals with laws and conventions, and then aspiration to live an ethical life for benefit of the society and organization.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1015.1 Apply human values and ethics in professional life.

A1015.2 Develop the moral ideals to maintain good relationships with people.

A1015.3 Solve environmental related problems by keeping health of human being into consideration.

A1015.4 Make use of the fundamental rights and human rights in life for individual dignity.

A1015.5 Build the sound health system both physically and mentally by practicing yoga, karate, sports etc.

3. Course Syllabus

UNIT-I

Introduction and basic concepts of society, family, community, and other community-based organizations, dynamics and impact, human values, gender justice.

Channels Of Youth Moments For National Building- NSS & NCC, philosophy, aims & objectives; emblems, flags, mottos, songs, badge etc. roles and responsibilities of various NSS functionaries. **Nehru yuva Kendra (NYK), activities** – socio cultural and sports.

UNIT-II

Fundamental rights and fundamental duties, human rights, consumer awareness and the legal rights of the consumer, RTI.

Youth and crime, sociological and psychological factors influencing youth crime, peer mentoring in preventing crimes, awareness about anti-ragging, cybercrime and its prevention, role of youth in peace-building and conflict resolution, role of youth in nation building.

UNIT-III

Environment issues, conservation, enrichment and sustainability, climate change, waste management, natural resource management (rain water harvesting, energy conservation, waste land development, soil conservations and afforestation). health, hygiene & sanitation, health education, food and nutrition, safe drinking water, sanitation, swachh bharat abhiyan.

UNIT-IV

Disaster management, role of youth in disaster management.home nursing, first aid. civil/ self-defense, civil defence services, taekwondo, Judo, karate etc.,

Gender sensitization, understanding gender – gender inequality –challenges – domestic violence, initiatives of government – schemes, law; initiates of NGOs – awareness, movement.

UNIT-V

Physical education, games and sports, Biological basis of physical activity, benefits of exercise, physical, psychological, social, respiration, blood circulation. yoga, protocol, postures, asanas, pranayama, kriyas, bandhas and mudras.

4. Books and Materials

Text Book(s):

1. Mike Martin and Roland Scherzinger, *Ethics in Engineering,* New York, McGraw Hill, 1996.
2. A.S. Chauhan, Society *and Environment,* Jain Brothers Publications, 6th edition, 2006.

Reference Book(s)

1. Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Engineering Ethics*, Prentice Hall of India, 2004.
2. Charles D Fleddermann, Engineering *Ethics*, New Jersey Prentice Hall, 2004 (Indian Reprint).
3. John R Boatright*, Ethics and the Conduct of Business*, New Delhi, Pearson Education, 2003.

COURSE STRUCTURE

VII - SEMESTER

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

VII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1431	Embedded Systems	PC	3	0	0	3	30	70	100
A1432	Wireless Communication Systems	PC	3	0	0	3	30	70	100
A1433	Digital Image Processing	PC	4	0	0	4	30	70	100
	Professional Elective – 4	PE	3	0	0	3	30	70	100
	Open Elective – 2	OE	3	0	0	3	30	70	100
A1434	Embedded Systems Laboratory	PC	0	0	4	2	30	70	100
A1435	Signal and Image Processing Laboratory	PC	0	0	4	2	30	70	100
A1436	Mini-Project/Internship	PW	0	0	4	2	100	-	100
A1437	Project Work Phase – I	PW	0	0	4	2	100	-	100
		TOTAL	16	00	16	24	410	490	900

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1431 – 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	30	70	100

1. Course Description

Course Overview

This course provides an introduction to embedded systems and their architecture considerations. Focus is on TM4C123GH6PM microcontroller which includes internal architecture, instruction set, register organization, addressing modes, on-chip peripherals and data communication protocols. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course will be useful to students as a first level course for embedded systems.

Course Pre/Corequisites

A1427 - Microprocessors and Microcontrollers

2. Course Outcomes (COs)

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

A1431.1 Analyze the embedded systems features and architecture considerations

A1431.2 Develop Programs using TM4C123GH6PM Microcontroller

A1431.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices

A1431.4 Apply Serial Communication Protocols for interfacing serial Devices.

A1431.5 Design Embedded Applications using TM4C123GH6PM Controller

3. Course Syllabus

UNIT - I

INTRODUCTION TO EMBEDDED SYSTEMS: Embedded System Introduction, Host and Target Concept, Embedded Applications, Features and Architecture Considerations for Embedded Systems- ROM, RAM, Timers, Data and Address Bus Concept, CISC vs RISC Design Philosophy, Von-Neumann Vs Harvard Architecture, Memory Types, Overview of Design Process of Embedded Systems, Programming Languages and Tools for Embedded Design.

UNIT - II

EMBEDDED CONTROLLER ARCHITECTURE: TM4C123GH6PM Block Diagram, Address Space, On-Chip Peripherals (Analog and Digital), Register Sets, Addressing Modes and Instruction Set Basics.

UNIT - III

OVERVIEW OF TM4C123GH6PM: I/O Pin Multiplexing, Pull Up/Down Registers, GPIO Control, Programming System Registers, Watchdog Timer, Need of Low Power for Embedded Systems, System Clocks and Control, Hibernation Module on TM4C, Active Vs Standby Current Consumption. Introduction to Interrupts, Interrupt Vector Table, Interrupt Programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

UNIT - IV

TOOLS OF EMBEDDED SYSTEMS: Embedded Hardware and Various Building Blocks, Processor Selection for an Embedded System, I/O Devices and I/O Interfacing Concepts, Timer and Counting Devices, Design Cycle in the Development Phase for an Embedded System, Uses of In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System, Design Metrics of Embedded Systems – Low Power, High Performance, Engineering Cost, Time-To-Market.

UNIT - V

EMBEDDED COMMUNICATIONS PROTOCOLS: Serial Communication Basics, Synchronous/Asynchronous Interfaces (Like UART, SPI, and I2C), Baud Rate Concepts, Implementing and Programming UART, SPI and I2C, SPI Interface Using TM4C.Case Study: Tiva Based Embedded System Application using the Interface Protocols for Communication with External Devices “Sensor Hub Booster Pack”.

4. Books and Materials

Text Book(s)

1. Raj Kamal. *Embedded Systems,* 2nd Edition, Tata McGraw-Hill Education, 2011.
2. Jonathan W Valvano. *Introduction to ARM Cortex - M Microcontrollers*, 5th Edition, Create space Publications.

References

1. http://processors.wiki.ti.com/index.php/HandsOn_Training_for_TI_Embedded_Processors.
2. http://processors.wiki.ti.com/index.php/MCU_Day_Internet_of_Things_2013_Workshop.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1432 – WIRELESS COMMUNICATION SYSTEMS

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

1. Course Description

Course Overview

This course teaches the concepts of wireless LAN and Bluetooth technologies and also the concepts of frequency reuse, hand-off strategies and cell-splitting. Students will understand the different multiple access techniques, differences between wireless and fixed telephone systems, and orthogonal frequency division multiplexing.

Course Pre/corequisites

A1419 - Digital Communication Systems

2. Course Outcomes (COs)

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

A1432.1 Compare various wireless communication systems.

A1432.2 Analyze different wireless local area networks and personal area networks.

A1432.3 Design different parameters of cellular system.

A1432.4 Identify the appropriate multiple accessing technique for wireless communication.

A1432.5 Develop the wireless networks.

3. Course Syllabus

UNIT - I

Introduction to wireless communication systems: Evaluation of mobile radio communications, examples of wireless communication systems, paging systems, cordless telephone systems, compression of various wireless systems.

UNIT - II

Mobile wireless communication systems: second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Bluetooth and personal area networks.

UNIT - III

Cellular system design fundamentals: spectrum allocation, basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, trucking and grade off service, improving coverage and capacity, cell splitting.

UNIT - IV

Multiple access technique for wireless communications: introduction to multiple accesses, FDMA, TDMA, spread spectrum multiple access, SDMA, packet radio, capacity of cellular systems.

UNIT - V

Wireless Networking: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in warless networks, wireless data services, common channel signaling.

4. Books and Materials

Text Book(s)

1. Theodore, S. Rappaport, *Wireless Communications, Principles, Practice,* PHI, 2nd Edn., 2002.
2. William Stallings, *Wireless Communication and Networking,* PHI, 2003.

Reference Book(s)

1. Kamilo Feher, *Wireless Digital Communications,* PHI, 1999.
2. Kaveh Pah Laven and P. Krishna Murthy, *Principles of Wireless Networks,* Pearson Education, 2002.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1433 – DIGITAL IMAGE PROCESSING

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	30	70	100

1. Course Description

Course Overview

The main objective of this course is to know the fundamentals and applications of image processing. The course deals with different image transforms, image enhancement in spatial and frequency domains including histogram processing, equalization, specification, edge linking and boundary detection. Different color models and image compression techniques are also covered .This course will provide an opportunity to the student to do the minor and major projects in the field of image processing applications.

Course Pre/corequisites

1. A1403 – Signals and Systems
2. A1425 – Digital Signal Processing

2. Course Outcomes (COs)

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

A1433.1 Demonstrate different operations on image pixels.

A1433.2 Distinguish between different types of image transforms.

A1433.3 Compare different image enhancement techniques.

A1433.4 Apply different techniques to perform image segmentation.

A1433.5 Contrast between different color models and compression techniques.

3. Course Syllabus

UNIT - I

Digital Image Fundamentals: Definition of image, types of images, image file formats, fundamental steps in digital image processing, elements of image processing, applications of image processing, sampling and quantization of images, basic operations on image pixels.

UNIT - II

Image Transforms: Unitary transform, 2-D Discrete Fourier transform and its properties, Separable image transforms: Walsh transform, Discrete Cosine Transform, Hadamard transform and Hotelling transform.

UNIT - III

Image Enhancement: Enhancement by point processing, Histogram processing, Histogram equalization, Histogram specification, Image smoothing and sharpening in spatial and frequency domains.

UNIT - IV

Image Segmentation: Detection of discontinuities: point, line and edge detection, Edge linking by boundary detection, Thresholding, Region-oriented segmentation: region growing, splitting and merging.

UNIT - V

Color Image Processing: RGB, CMY, HSI, HSV and YIQ color models; basics of color image enhancement.

Image Compression: Redundancy and types, Image compression model, Source encoder and decoder, Huffman coding, Arithmetic coding, Improved Gray scale code.

4. Books and Materials

Text Book(s)

1. R.C. Gonzalez, R.E. Woods, *Digital Image Processing*, Addison Wesley/Pearson education, 3rd Edition, 2010.

Reference Book(s)

1. Rafael C. Gonzalez, Richard E Woods and Steven L.Eddins, *Digital Image processing using MATLAB*, Tata McGraw Hill, 2010.
2. S.Jayaraman, S .Esakkirajan, T.Veerakumar, *Digital Image processing,* Tata McGraw Hill, 2009.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1434 – EMBEDDED 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	30	70	100

1. Course Description

Course Overview

This laboratory course provides the students with the knowledge of embedded C programming – GPIO ports, low power modes, interrupts, PWM and interfacing potentiometer using Code Composer Studio on TM4C123GH6PM microcontroller.

Course Pre/Corequisites

1. A1427 – Microprocessors and Microcontrollers
2. A1431 – Embedded Systems

2. Course Outcomes (COs)

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

A1434.1 Build Embedded C Programs using TM4C123GH6PM microcontroller.

A1434.2 Execute TM4C123GH6PM Programs using Code Composer Studio.

A1434.3 Interface LEDs, Push Buttons, Potentiometer to TM4C123GH6PM.

A1434.4 Test and Debug TM4C123GH6PM Programs using Code Composer Studio.

A1434.5 Develop embedded systems applications using TM4C123GH6PM.

3. Course Syllabus

1. Write a C program for configuration of GPIO ports for Input and output operation (blinking LEDs, push buttons interface).
2. Write a C program for EK-TM4C123GXL Launchpad and associated Timer ISR to toggle on board LED using interrupt programming technique.
3. Write a C program to configure hibernation mode and wake up the EK TM4C123GXL Launchpad when on-board switch SW2is pressed.
4. Write a C program to configure in-built ADC of TM4C123GH6PM microcontroller and interface potentiometer with EK-TM4C123GXL Launchpad to observe corresponding 12- bit digital value.
5. Write a C program to configuring and programming the in-built PWM module of TM4C123GH6PM microcontroller.
6. Write a C program to configure the PWM and ADC modules of TM4C123GH6PM microcontroller to control the brightness of LED with a PWM signal based on the potentiometer output.
7. Write a C program to send an echo of the data input back to the PC terminal using UART.
8. Write a C program to find the angle and hypotenuse of a right angle triangle using IQmath library of TivaWare.

4. Laboratory Equipment/Software/Tools Required

1. Computers installed with operating systems
2. Code Composer Studio Software
3. EK-TM4C123GXL Launchpad with USB Cable

5. Books and Materials

Reference Books

1. Dhananjay V. Gadre, Sarthak Gupta. Getting Started with Tiva ARM Cortex M4 Microcontrollers, 1st Edition, Springer Publications, 2018.
2. Jonathan W Valvano. Introduction to ARM Cortex - M Microcontrollers, 5th Edition, Create space Publications.

Other 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

A1435 – SIGNAL AND IMAGE PROCESSING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	4	0	0	56	2	30	70	100

1. Course Description

Course Overview

This laboratory course introduces MATLAB programming in signal and image processing. This course deals with computation of Discrete Time Fourier Transform, Inverse Discrete Fourier Transform, linear and circular convolution, implementation of Finite Impulse Response and Infinite Impulse Response Filters with given specifications. In addition, this course covers histogram processing and equalization, filtering, thresholding and sharpening operations on images. This laboratory course will provide an opportunity to enhance programming skills by using MATLAB in signal and image processing domains.

Course Pre/corequisites

1. A1425 – Digital Signal Processing
2. A1433 – Digital Image Processing

2. Course Outcomes (COs)

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

A1435.1 Compile programs to perform DFT, IDFT and FFT a given sequence.

A1435.2 Design different filters in discrete time domain.

A1435.3 Preform different operations on images using MATLAB.

A1435.4 Analyze the histogram of given images.

3. Course Syllabus

1. Generate different discrete-time signals.
2. Compute DFT and IDFT of given discrete-time signal.
3. Perform linear and circular convolution of sequences.
4. Generate FFT of a given sequence.
5. Design different FIR filters for a given sequence.
6. Design different IIR filters for a given sequence.
7. Perform basic operations on images.
8. Plot the histogram of gray scale and color images.
9. Perform histogram equalization.
10. Average and median filtering operations on image.
11. Thresholding and edge detection of an image.
12. Addition of noise and image sharpening.

4. Laboratory Equipment/Software/Tools required

1. Computers installed with operating systems.
2. MATLAB software.

5. Books and Materials

Text Book(s)

1. Rafael C. Gonzalez, Richard E Woods and Steven L.Eddins, *Digital Image processing using MATLAB*, Tata McGraw Hill, 2010.

Reference Book(s)

1. S. Jayaraman, S .Esakkirajan, T.Veerakumar, *Digital Image processing,* Tata McGraw Hill, 2009.

COURSE STRUCTURE

VIII - SEMESTER

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

VIII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	MOOCs Course/ Professional Elective – 5	PE	3	0	0	3	30	70	100
	Open Elective – 3	OE	3	0	0	3	30	70	100
A1438	Technical Seminar	PC	0	0	4	2	100	-	100
A1439	Project Work Phase – II	PW	0	0	16	8	60	140	200
		TOTAL	06	00	20	16	220	280	500

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROFESSIONAL ELECTIVES

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1451 – DATA COMMUNICATIONS AND NETWORKING

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 study of Data Communications and Networking is essential for Electronics and Communication Engineering graduates. Networking is a key element in establishing communication between two end points. This course provides an overview of the fundamentals of computer networks and the layered architectures. The course covers various transmission media, error detection and correction techniques, IEEE standards, algorithms and protocols of all layers. The knowledge provided by this course will be used to develop networks for sharing data.

Course Pre/corequisites

A1419 – Digital Communication Systems

2. Course Outcomes (COs)

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

A1451.1 Analyze the layers of reference models used for communication in various networks.

A1451.2 Apply the principles of error detection and correction to transfer data without errors.

A1451.3 Interpret various IEEE standards and channelization protocols.

A1451.4 Analyze the issues with host naming, addressing, and routing packets in internet.

A1451.5 Inspect the process to delivery data using TCP and UDP in transport layer.

3. Course Syllabus

UNIT-I

Introduction to Networks and data communication: The internet, protocols and standards, layered tasks, OSI model, TCP/IP, addressing, guided and unguided transmission media.

UNIT-II

Data Link Layer: Introduction, framing, error detection and correction, LRC, CRC, hamming code, flow and error control protocols, noiseless and noisy channel protocols.

UNIT-III

Multiple Access: Aloha, controlled access, channelization, IEEE standards: standard ethernet, changes in the standard, fast ethernet, gigabit ethernet, wireless LANs.

UNIT-IV

Network Layer: Virtual circuit and datagram approach in subnets, shortest path routing, flooding, hierarchical routing, broadcast routing, multicast routing and distant vector routing algorithms, congestion control algorithms, IPV4 and IPV6 addresses.

UNIT-V

Transport Layer: TCP and UDP, session layer-encryption, ciphers, types of ciphers, DES algorithm, public key cryptography-RSA Algorithm.

4. Books and Materials

Text Book(s)

1. Behrouz.A. Forouzan, *Data communications and Networking*, 2nd edition, TMH, 2003.
2. Andrew S. Tanenbaum, *Computer Networks*, 3rd edition, PHI, 2001.

Reference Book(s)

1. Wayne Tomasi (2005), *Introduction to Data Communications and Networking*, Pearson Education, India.
2. William Stallings, *Data and Computer Communications*, 3rd edition, Pearson, 2007.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1452 – ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

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 objective of the course is to introduce the fundamentals of electronic instruments and measurements providing an in-depth understanding of measurement errors. This course provides the students the study of different topics like bridge measurements, storage oscilloscope, function generator and analyzer, display devices, data acquisition systems and transducers.

Course Pre/corequisites

1. A1003 Engineering Physics
2. A1201 Network Analysis
3. A1401 Electronic Devices and Circuits
4. A1409 Electronic Circuit Analysis

2. Course Outcomes (COs)

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

A1452.1 Analyze the performance characteristics of different measurement instruments and their errors.

A1452.2 Analyze the function of CRO used to measure frequency, amplitude and phase.

A1452.3 Compare the operation of different signal generators and wave form analysers.

A1452.4 Select an appropriate bridge network for the measurement of electrical quantities.

A1452.5 Make use of Sensors and transducers to measure the required physical quantities.

3. Course Syllabus

UNIT-I

Performance characteristics of Instruments: Introduction to static and dynamic characteristics, accuracy, precision, resolution, sensitivity, speed of response, fidelity, lag and dynamic error, errors in measurement and their statistical analysis.

Ammeters, Voltmeters and Ohmmeters: Introduction to DC and AC ammeters and voltmeters, multi range, solid state, differential voltmeters, thermo couple type RF ammeter, series and shunt types of ohmmeters, multimeter.

UNIT-II

Oscilloscopes: Block diagram, specifications, CRT features, vertical and horizontal deflection systems, sweep trigger pulse circuit, delay line, sync selector circuits, probes for CRO - active, passive, attenuator type, dual trace and dual beam CRO, lissajous method. Sampling oscilloscope and storage oscilloscopes.

UNIT-III

Signal Generators and Wave Analyzers: Fixed, variable and AF oscillators, function generators, sweep and arbitrary waveform generators, wave analyzers– harmonic distortion, spectrum and logic analyzers.

UNIT-IV

DC and AC Bridges: Wheatstone's bridge, Kelvin's Bridge, Wien's bridge, errors and precautions in using bridges, Maxwell's bridge, Anderson bridge and schearing Bridge.

UNIT-V

Sensors and Transducers: Active and passive transducers, measurement of displacement– Resistance, capacitance, inductance and LVDT. Strain guages, pressure-piezoelectric transducers, temperature transducers-resistance thermometers, thermo couples, thermistors; velocity, acceleration and vibration measurements using tranducers.

4. Books and Materials

Text Book(s)

1. H.S Kalsi, *Electronic Instrumentation,* Tata McGraw-Hill, 2004.

Reference Book(s)

1. A.D.Helfrick,W.D.Cooper, *ModernElectronicInstrumentationandMeasurementTechniques*, PHI, 5th edition, 2002.
2. DavidA. Bell, *ElectronicInstrumentationandMeasurements*, PHI,2nd edition, 2003.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1453 – ADVANCED DIGITAL SYSTEM DESIGN

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

1. Course Description

Course Overview

This course provides an in-depth coverage of systematic development and synthesis of advanced digital integrated circuits with an emphasis on synchronous, asynchronous systems and programmable logic devices. This course starts with an introduction of EDA software development flow and covers design of synchronous and asynchronous sequential circuits, ASM charts and finite state machines. This provides the basis for understanding the latest state of the art system on chip (SOC) design methodologies.

Course Pre/co requisites

A1402 – Digital Logic design

2. Course Outcomes (COs)

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

A1453.1 Compare the performance of various digital logic families.

A1453.2 Analyze the sequential circuits using state reduction techniques.

A1453.3 Apply the sequential network to solve synchronous & asynchronous design behaviour.

A1453.4 Design advanced digital systems using finite state machines.

A1453.5 Design complex circuits using programmable logic devices.

3. Course Syllabus

UNIT-I

Introduction to Digital System Design: Device technologies, representation, levels, EDA software, development flow, digital logic families– functionality, design, comparison and review.

UNIT-II

Sequential circuit design: Analysis of clocked synchronous sequential circuits and modelling – state diagram, state table, assignments and reduction, design of synchronous sequential circuits.

UNIT-III

Synchronous Sequential Networks: Structure, analysis of clocked synchronous sequential networks (CSSN), modelling of CSSN behaviour, state table reduction, state assignment, design of CSSN, ASM charts, ASM tables.

UNIT-IV

Asynchronous Sequential Logic Design: Structure, analysis of asynchronous sequential circuit– flow table reduction, races, state assignment, transition table.

UNIT-V

Finite State Machine: Overview, representation, Moore machine vs Mealy machine, Sate assignment, design examples– state detector, FSM based binary counter.

CPLD: Introduction, design of complex circuits using the basic structures, architecture of CPLD (Xilinx/Altera), overview of PLDs and CPLD with design examples.

4. Books and Materials

Text Book(s)

1. Sunggu Lee, *Advanced Digital Logic Design using VHDL, state machines and Synthesis for FPGAs*, 1st edition, Cengage.
2. Donald G. Givone, *Digital principles and Design*, Tata McGraw Hill, 2002.

Reference Book(s)

1. Charles H. Roth, *Fundamentals of Logic design*, 5th edition, Cengage Learning, 2004.
2. John F Walkerly, *Digital Design: Principles & Practices*, 4th edition, pearson, 2008**.**

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1454 –INTERNET OF THINGS

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

1. Course Description

Course Overview

This course covers the development of internet of things (IoT) products and services including devices for sensing, actuation, processing and communication. This course helps the students to describe the technology around the Internet of Things (IoT). In this course students study, python concepts, how to interface I/O devices, sensors using arduino uno and raspberry pi. This course has simple examples with integration of techniques turned into an application.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1454.1 Analyze IoT applications using IoT design principles, protocols and levels.

A1454.2 Distinguish sensors and actuators in terms of their functions and applications.

A1454.3 Interface I/O devices, Sensors using Arduino uno.

A1454.4 Apply Python concepts for programming of Raspberry Pi.

A1454.5 Develop IoT applications using Raspberry Pi and Arduino uno.

3. Course Syllabus

UNIT-I

Introduction to IoT: Characteristics of IoT, design principles of IoT,IoT architecture and protocols, enabling technologies for IoT, IoT levels.

UNIT-II

Sensors and Actuators: Sensor-definition, features, characteristics of sensor, different types of sensors, actuator-definition, different types of actuators, purpose of sensors and actuators in IoT.

UNIT-III

Programming with Arduino: Introduction to Arduino UNO, Arduino IDE, program elements, serial commands LCD commands. LED interface, switch interface, serial interface, LCD interface, potentiometer interface, DHT sensor interface.

UNIT-IV

Python: Overview of python, features, comments, variables, operators, data types, If statement, functions, for loop, while loop, strings, lists, tuples, dictionaries, modules, exceptions, reading files, writing files.

UNIT-V

IoT Implementation with Raspberry Pi: Introduction to Raspberry Pi, installation of raspbian OS, connecting to laptop, terminal commands, LED interface, button interface, DHT sensor interface. Case studies-home automation using MQTT, remote data logging.

4. Books and Materials

Text Book(s)

1. Jeeva Jose,*Internet of Things,*1st edition,Khanna Book Publishing, 2019.
2. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain,*Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019.

Reference Book(s)

1. Vijay Madisetti, Arshdeep Bahga,*Internet of Things — A hands on Approach*, 1st edition, University Press, 2014.
2. Adrian McEwen, Hakim Cassimally,*Designing the Internet of Things*, 1st edition, John Wiley and Sons, 2014.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1455 – MICROWAVE 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	30	70	100

1. Course Description

Course Overview

This course provides an overview of application of microwave in communication and other areas. This course covers fundamentals of microwaves along with description of microwave transmission lines, various microwave components, tubes, solid state devices and knowledge on microwave measurements. This course is useful for design and analysis of different microwave systems.

Course Pre/corequisites

1. A1401 – Electronic Devices and Circuits
2. A1410 – Electromagnetics and Transmission Lines

2. Course Outcomes (COs)

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

A1455.1 Analyze rectangular waveguide transmission line characteristics using concepts of Electromagnetic theory.

A1455.2 Evaluate relation between input(s) and output(s) of microwave passive components using scattering parameters.

A1455.3 Compare performance of O-type and M-type microwave tubes.

A1455.4 Sketch the characteristics of microwave solid state devices.

A1455.5 Measure microwave parameters using microwave bench setup.

3. Course Syllabus

UNIT-I

Rectangular Waveguides: Wave equations, TE/TM mode, fields, characteristic equation, cutoff frequencies, filter characteristics, dominant and degenerate modes. Mode characteristics – phase and group velocity, wavelengths, impedance relations, impossibility of TEM mode.

UNIT-II

Wave guide multiport junctions: E plane and H plane Tees, magic Tee, and directional coupler.

Ferrite components: Gyrator, isolator, circulator.

Scattering Parameters: S-Matrix calculation for waveguide multiport junctions and ferrite components.

UNIT-III

O-Type tubes: Operation and performance of two-cavity klystron, reflex klystron oscillator and travelling wave tube (TWT) amplifier.

M-Type tubes: Magnetron-mode separation, frequency pushing and frequency pulling and applications.

UNIT-IV

Transferred electron devices- GUNN diode.

Avalanche transit time devices- IMPATT, TRAPATT and BARITT diodes.

UNIT-V

Microwave Measurements: Description of microwave bench-different blocks and their features, microwave power measurement-Bolometers, measurement of attenuation, frequency and VSWR, impedance measurement, scattering parameter measurement for 3 and 4 port devices.

4. Books and Materials

Text Book(s)

1. Samuel Y.Liao, *Microwave devices and circuits*, 3rd edition, PHI 2003.
2. M. Kulkarni, *Microwave & Radar Engineering*, 3rd edition, Umesh Publications, 2003.

Reference Book(s)

1. R.E.Collin, *Foundations for microwave engineering*, IEEE press, John Wiley, 2nd edition, 2002.
2. M.L.Sisodia and G.S.Raghuvanshi, *Microwave circuits and passive devices,* Wiley Eastern Ltd., New age International publishers Ltd., 1995.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1456 – NANOTECHNOLOGY

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

Nanotechnology is the study of manipulating matter on an atomic, molecular and supramolecular scale. This course deals with the classification of materials and their properties. The classification, fundamentals and properties of nanomaterials are also covered in detail. This course will provide an opportunity to the student to study about nanotechnology which is one of the emerging fields of technology.

Course Pre/corequisites

1. A1003 – Engineering Physics
2. A1401 – Electronic Devices and Circuits

2. Course Outcomes (COs)

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

A1456.1 Distinguish between different types of materials and their properties.
A1456.2 Compare different types of nanomaterials.
A1456.3 Analyze different properties of nanomaterials.
A1456.4 Contrast between different types of carbon nanotubes.

3. Course Syllabus

UNIT-I

Introduction: Scale, structure, and behaviour and brief history of materials, nanomaterials and nanostructures in nature.

UNIT-II

Material Classes, Structure, and Properties: Classes of materials, the internal structure of materials, mechanical, thermal, electrical, magnetic, optical, and acoustic behaviours.

UNIT-III

Classification of Nanomaterials: Classification of nanomaterials, size effects, surface-to-volume ratio versus shape, magic numbers, surface curvature, strain confinement, quantum effects.

UNIT-IV

Properties of Nanomaterials: Mechanical, thermal, electrical, Magnetic, optical and acoustic properties.

UNIT-V

Special Cases of Nanomaterials: Single-walled and multiwalled carbon nanotubes, typical field-effect transistor, supercapacitors, nanocomposites, intercalated and exfoliated polymers.

4. Books and Materials

Text Book(s)

1. Michael F. Ashby, Paulo Ferreira, and Daniel L. Schoedek, *Nanomaterials, Nanotechnologies and design*, Elsevier Ltd, 2009.

Reference Book(s)

1. Charles P. Poole, Jr., and Frank J. Owens, *Introduction to Nanotechnology*, John Wiley & Sons, 2003.
2. Michael Reith, *Nano-Engineering in Science and Technology, World Scientific Publishing Co. Pt. Ltd., 2003.*

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1457 – SYSTEM VERILOG AND VERIFICATION

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 gives you an in-depth introduction to the main System Verilog enhancements to the Verilog hardware description language (HDL). It discusses the benefits of the new features, and demonstrates how design and verification can be more efficient and effective when using System Verilog constructs. The course also teaches how to code in System Verilog language – which is the most popular Hardware Description Language used for SOC design and verification in semiconductor industry. This course helps the students to learn everything about System Verilog Assertions (SVA) and Functional coverage coding which forms the basis for the Assertion based and Coverage Driven Verification methodologies.

Course Pre/corequisites

1. A1453 – Advanced Digital System Design
2. A1421 – Digital Design through Verilog HDL Laboratory

2. Course Outcomes (COs)

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

A1457.1 Develop language constructs of System Verilog HDLs and implements a digital logic effectively.

A1457.2 Utilize assertions to quickly correct behavior in simulation.

A1457.3 Design an interface between the System Verilog test program and the Device Under Test.

A1457.4 Construct a device driver routines to drive DUT input with stimulus from generator.

A1457.5 Execute device drivers, monitors and self-checking routines concurrently.

3. Course Syllabus

UNIT-I

Basics of Verilog and simulation schematic: Processing of multi threads, simulation event queue, basic coding guidelines for design and test bench. System Verilog for design– data type system, enum, typedef, struct, union, packed/unpacked.

Nets and variables: Key changes in Verilog, 2005 and System Verilog, continuous assignment to variables, modules and processes, port connection shorthand, procedural programming statements.

UNIT-II

Design applications of interfaces: The interface constructs, interfaces to encapsulate communication, modports, synthesis of interfaces and modports, imported functions for design.

System Verilog for Verification: Data types, Logic, enum, string, typedef, struct, union-packed/unpacked, packages, Arrays– Fixed, dynamic, procedural statements and routines-conditional if, operators and expressions. Loops– while, for, repeat, foreach, functions and tasks.

UNIT-III

System Verilog TB and design: Interfaces, clocking blocks and skews, modports. OOP – 1, OOP – 2, randomization.

UNIT-IV

Packages: Usage of packages in design and verification, scope rules, static and dynamic life scope. Package declarations– Referencing data within packages, package search order rules, exporting imported names from packages.

UNIT-V

Threads and Inter process Communication: Creating threads, automatic variables in threads, fork join none, any, all, disable, disable fork, wait fork, wait(..), event, mailbox (FIFO), semaphore.

Functional coverage: Defining coverage groups, defining coverage points, defining cross coverage, coverage options, coverage system tasks and system functions, coverage computation.

4. Books and Materials

Text Book(s)

1. S. Sutherland, S. Davidmann, P. Flake, *System Verilog for Design,* 2nd edition, Springer, 2006.

Reference Book(s)

1. Z. Dr Mark, *Digital System Design with System Verilog,* Pearson, 2010.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1458 – REAL TIME 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	30	70	100

1. Course Description

Course Overview

Real Time Software Designers must be familiar with Computer Architecture and Organization, Operating Systems, Software related to embedded systems, Programming Languages(C, Assembly Language) and Compilation Techniques. This Course provides an overview of these techniques from the perspective of the real-time system designer. It covers techniques for Scheduling, Resource Access Control and Validation that are likely to be used in real-time computing and communication systems. Practical experience is gained during student work exercises

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1458.1 Compare and contrast a real time operating system with other operating system.

A1458.2 Design the applications to run in parallel either using processes or threads.

A1458.3 Develop a practical real time system by using optimal core elements.

A1458.4 Analyze the scheduling schemes for packet switching networks and protocols for the broadcast networks.

A1458.5 Test for the performance analysis of different real time systems.

3. Course Syllabus

UNIT-I

Basic Real-Time Concepts: Terminology, real-time system design issues, example real-time systems, common misconceptions, brief history; hard vs soft real-time systems. a reference **Model Of Real Time Systems:** Processors and resources, temporal parameters of real time work load, periodic task model precedence constraints and data dependency, functional parameters, resource parameters of jobs and parameters of resources, typical real time applications.

UNIT-II

Real-Time Kernels: Pseudo kernels, interrupt-driven systems, preemptive-priority systems, hybrid systems, the task-control block model, theoretical foundations of real-time operating systems. intertask communication and synchronization: buffering data, time-relative buffering, ring buffers, mailboxes, queues, critical regions, semaphores, other synchronization mechanisms, deadlock, priority inversion.

Real Time Scheduling: Commonly used approaches to real time scheduling, clock driven scheduling, priority driven scheduling; scheduling aperiodic and sporadic jobs in priority driven systems.

UNIT-III

Memory Management: Process stack management, run-time ring buffer, maximum stack size, multiple-stack arrangements, memory management in the task-control-block model, swapping, overlays, block or page management, replacement algorithms, memory locking working sets ,real-time garbage collection, contiguous file systems ,building versus buying real-time operating systems, selecting real-time kernels.

UNIT-IV

Hadrware Considerations To Real Time Systems: Basic architecture, hardware interfacing, central processing unit, memory, input/output, enhancing performance, other special devices, non von-neumann architectures**.**

Real Time Communication: Model of real time communication, priority based service disciplines for switched networks, weighted round robin service disciplines, and medium access-control protocols of broadcast networks, internet and resource reservation protocols, real time protocol, communication in multicomputer systems.

UNIT-V

Case Studies: Threads,posix mutexes and condition ,posix semaphores ,using semaphores and shared memory ,posix messages ,real-time posix signals ,clocks and timers ,asynchronous input and output , posix memory locking.

4. Books and Materials

Text Book(s)

1. Liu, Jane W. S.,*Real-Time Systems*, 8th edition, Pearson Education, 2009.
2. A. Phillip Laplante,*Real Time Systems Design and Analysis*, 3rd edition, John Wiley and Sons, 2004.

Reference Book(s)

1. C. M. Krishna, Kang G. Shin (2010), *Real Time Systems*, Tata McGraw-Hill, New Delhi.
2. K. V. K. K. Prasad (2005), *Embedded Real Time Systems*, Dream tech Press, New Delhi.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1459 – RADAR 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	30	70	100

1. Course Description

Course Overview

The extensive usage of radar system has necessitated the students to have thorough knowledge of radar systems. The basic form to modified form of radar range equation provides the better understanding in the development of variants of radar systems. This course deals with calculation of target's range discussed using pulse radar. CW radar wraps with the estimation of target's relative velocity. Further, the discrimination of target in the presence of clutter described well using MTI and PDR system. The course continues with tracking mechanisms, radar displays, antennas, receivers and detection of signals under noisy environment.

Course Pre/corequisites

A1404 – Probability Theory and Stochastic Processes

2. Course Outcomes (COs)

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

A1459.1 Distinguish various radar systems and trackers based on characteristics and applications.

A1459.2 Derive modified radar range equation and characteristics equation of Matched Filter.

A1459.3 Derive range, relative velocity and angle error for different radars.

A1459.4 Analyze the functionality of various elements of the radar receiver.

3. Course Syllabus

UNIT-I

Basics Of Radar: Introduction, simple form of radar equation, radar block diagram and operation, radar frequencies and applications, receiver noise, modified radar range equation.

Radar Equation: SNR, envelope detector, false alarm time and probability, integration of radar pulses, radar cross section of targets (simple targets - sphere, cone-sphere), transmitter power, prf and range ambiguities, system losses (qualitative treatment).

UNIT-II

CW and Frequency Modulated Radar: Doppler effect, CW radar – block diagram, isolation between transmitter and receiver, non-zero if receiver, receiver bandwidth requirements, applications.

FM-CW Radar: Range and doppler measurement, block diagram and characteristics (approaching/ receding targets), FM-CWaltimeter, multiple frequency CW radar.

UNIT-III

MTI and Pulse Doppler Radar: Introduction, principle, MTI radar with - power amplifier transmitter and power oscillator transmitter, delay line cancellers – filter characteristics, blind speeds, double cancellation, staggered PRFs, range gated doppler filters, MTI versus pulse doppler radar.

UNIT-IV

Tracking Radar: Tracking with radar, sequential lobing, conical scan, monopulse tracking radar – amplitude comparison monopulse (one- and two- coordinates), phase comparison monopulse, tracking in range, acquisition and scanning patterns, comparison of trackers.

UNIT-V: Detection of Radar Signals in Noise: Introduction, matched filter receiver – response characteristics and derivation, correlation function and cross-correlation receiver, efficiency of non-matched filters, matched filter with non-white noise.

Radar Receivers: Noise figure and noise temperature, displays – types. duplexers – branch type and balanced type, circulators as duplexers, introduction to phased array antennas, series versus parallel feeds, applications, advantages and limitations.

4. Books and Materials

Text Book(s)

1. Merrill I. Skolnik , *Introduction to Radar Systems*, TMH Special Indian Edition, 3rd edition, 2017.

Reference Book(s)

1. Byron Edde, *Radar Principals, Technology, Applications*, Pearson Education, 2004.
2. Peebles, Jr, *Radar Principles*, P.Z.Wiley, NewYork, 1998.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1460 – BIOMEDICAL SIGNAL PROCESSING

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

1. Course Description

Course Overview

This course presents an overview of different methods used in biomedical signal processing. Signals with bioelectric origin are given special attention and their properties and clinical significance are reviewed. In many cases, the methods used for processing and analysing biomedical signals are derived from a modelling perspective based on statistical signal descriptions. The purpose of the signal processing methods ranges from reduction of noise and artifacts to extraction of clinically significant features.

Course Pre/corequisites

1. A1404 – Probability Theory and Stochastic Processes
2. A1425 – Digital Signal Processing

2. Course Outcomes (COs)

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

A1460.1 Analyze the nature of biomedical signals and related concepts.

A1460.2 Apply averaging technique on biomedical signals and extract the features.

A1460.3 Design various time domain filtering techniques for the removal of artefact from biomedical signal.

A1460.4 Apply signal compression techniques on biomedical signals.

A1460.5 Analyze event detection techniques for EEG and ECG signals.

3. Course Syllabus

UNIT-I

Introduction to Biomedical Signals: The nature of biomedical signals, examples, objectives and difficulties in biomedical analysis.

Biomedical signal origin and its dynamics: Basic electrocardiography, ECG leads systems, ECG signal characteristics.

UNIT-II

Signal Averaging: Basics of signal averaging, signal averaging as a digital filter, typical averager, software for signal averaging, limitations of signal averaging.

Adaptive Noise Cancelling: Principal noise canceller model, 60-Hz adaptive cancelling using a sine wave model, other applications of adaptive filtering

UNIT-III

Data Compression Techniques: Turning point algorithm, AZTEC algorithm, Fan algorithm, Huffman coding, data reduction algorithms– Fourier transform, correlation, convolution, power spectrum estimation.

UNIT-IV

Cardiologicalsignal processing: Basic Electrocardiography, ECG data acquisition, ECG lead system, ECG signal characteristics (parameters and their estimation), analog filters, ECG amplifier, and QRS detector, power spectrum of the ECG, QRS detection algorithm.

UNIT-V

Neurological Signal processing: Brain and its potentials, Electrophysiological origin of Brain waves, EEG signal and its characteristics, EEG analysis, Autoregressive (AR) method, Recursive Estimation of AR parameters.

4. Books and Materials

Text Book(s)

1. D.C.Reddy, *Biomedical Signal Processing- Principles and Techniques*, Tata McGraw-Hill, 2005.

Reference Book(s)

1. Willis J.Tompkins, *Biomedical Digital Signal Processing*, PHI, 2000.
2. Rangayyan Rangaraj, *Biomedical signal analysis- A case study approach*, Wiley (IEEE Press), 2005.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1461 – FPGA Design

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

1. Course Description

Course Overview

Programmable Logic is emerging as a prominent core technology to build electronic systems. In particular, high performance systems are now almost always implemented with FPGAs. This course covers FPGA architectures, design processes, logic implementation and features, SRAM based FPGA, finite state machines and case studies. This course will provide the learner the foundations required to design VSLI and DSP systems using FPGA.

Course Pre/corequisites

1. A1402 – Digital Logic Design
2. A1421 – Digital Design through Verilog HDL Laboratory

2. Course Outcomes (COs)

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

A1461.1 Discuss different PLDs based on real time applications and compare its architectures.

A1461.2 Analyze the programmable technologies used in FPGAs.

A1461.3 Design combinational and sequential circuits using FPGA.

A1461.4 Distinguish between technology dependent and technology independent optimizations while implementing logic in FPGA.

A1461.5 Make use of finite state machines to design applications on FPGA.

3. Course Syllabus

UNIT-I

Introduction to Programmable Logic Architectures: Programmable sum-of-products Arrays, PAL fuse matrix, combinational outputs, PAL outputs with programmable polarity, PAL devices with programmable polarity, universal PAL and generic array logic.

UNIT-II

FPGA Based Systems: Introduction, Digital Design, FPGA based system design.

FPGA Fabrics: FPGA architectures, SRAM based FPGAs, permanently programmed FPGAs. Chip input/output, circuit design of FPGA fabrics, architecture of FPGA fabrics.

UNIT-III

Combinational Logic: The logic design process, combinational network delay, power and energy optimization, arithmetic logic.

Sequential Machines: Introduction, the sequential machine design process, sequential design styles, rules for clocking, performance analysis.

UNIT-IV

Logic Implementation Using FPGA: Syntax directed translation, logic implementation by macro, logic synthesis, technology independent and dependent logic optimizations, physical design for FPGAs, logic design process revisited.

UNIT-V

Finite State Machine: State transition table, state assignment for FPGAs, hazard and one hot encoding. **Case Studies:** Case studies Xilinx XC4000 and ALTERA's FLEX 8000.

4. Books and Materials

Text Book(s)

1. Wayne Wolf, *FPGA Based System Design*, Pearson Education, New Delhi, 2004.

Reference Book(s)

1. S. Trimberger, Edr.,*Field Programmable Gate Array Technology*, Kluwer Academic Publications, New Dehi, 1994.
2. P. K. Chan, S. Moura, *Digital Design Using Field Programmable Gate Array*, PHI, 1994.
3. John V. Old Field, Richrad C. Dorf, *Field Programmable Gate Arrays*, Wiley, 2008.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1462 – EMBEDDED HARDWARE AND SOFTWARE CO-DESIGN

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

1. Course Description

Course Overview

This course provides an introduction to Hardware-Software Co-Design which focuses on the fundamental issues related to design of integrated hardware and software products. This course covers the models, architectures, synthesis algorithms, prototyping-emulation techniques, target architectures, design specifications and verification tools. This course provides the knowledge to students in the domain of embedded systems specialization.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1462.1 Apply techniques for the concurrent design or co-design of embedded systems that are dedicated to specific applications.

A1462.2 Apply hardware and software design techniques for construction of embedded systems.

A1462.3 Distinguish various target architectures based on architecture specialization techniques.

A1462.4 Discuss modern design methodologies with an emphasis on early design phases, including modeling, verification and system-level synthesis.

3. Course Syllabus

UNIT-I

Co-Design Issues: Co-design models, architectures, languages, a generic co-design methodology.

UNIT-II

Co-Synthesis Algorithms: Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

UNIT-III

Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure.

UNIT-IV

Target Architectures: Architecture specialization techniques, system communication infrastructure, target architecture and application system classes, architecture for control dominated systems

(8051-architectures for high performance control), architecture for data dominated systems (adsp21060, tms320c60), and mixed systems.

UNIT-V

Design Specification and Verification: Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, and interface verification.

4. Books and Materials

Text Book(s)

1. Jorgen Staunstrup, Wayne Wolf,*Hardware/software Co-design Principles and Practice*, Springer, 2009.
2. Giovanni De Micheli, Mariagiovanna Sami,*Hardware / Software Co- Design*, Kluwer Academic Publishers, 2002.

Reference Book(s)

1. Patrick R. Schaumont,*A Practical Introduction to Hardware/Software Co-design*, Springer, 2010.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1463 – CELLULAR AND MOBILE COMMUNICATIONS

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 provides the basic knowledge of wireless and mobile cellular communication systems over a stochastic fading channel. This course covers the understanding of advanced multiple access techniques. This course helps the students in understanding of digital cellular systems (GSM, CDMA One, GPRS, CDMA 2000, and W-CDMA).

Course Pre/corequisites

A1409 - Analog Communication Systems

A1418 - Antenna and wave propagation

2. Course Outcomes (COs)

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

A1463.1 Analyze the cellular mobile system design concepts to improve the signal to noise ratio and cell coverage.

A1463.2 Interpret the Co-channel interferences and their parameters to improve the system capacity.

A1463.3 Illustrate the importance of cell coverage for signal and traffic, diversity techniques and mobile antennas to a caller.

A1463.4 Utilize the Omni directional and directional antennas to improve the channel capacity and interference reduction.

A1463.5 Demonstrate the Interim Standard, Digital Enhanced Cordless System, multiple access schemes of the wireless networks and standards and types of handoff.

3. Course Syllabus

UNIT - I

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile system, performance criteria, operation of cellular systems, Hexagonal shaped cells.

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN: concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting.

UNIT - II

INTERFERENCE: Introduction to Co-channel interference, real time Co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

UNIT - III

CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain.

UNIT - IV

CELL SITE AND MOBILE ANTENNAS: Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas.

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units.

UNIT - V

HANDOFF: Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff.

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

4. Books and Materials

Text Book(s)

1. W .C. Y. Lee, *Mobile cellular telecommunications*, Wiley-India edition, 3rd edition, 2010.
2. Theodore. S. Rapport, *Wireless communications,* Pearson Education, 2nd edition,2002.

Reference Book(s)

1. Gordon L. Stuber, *Principles of Mobile communications,* Springer International, 2nd Edition, 2007.
2. Lee, *Wireless and Mobile Communications*, McGraw Hills, 3rd Edition, 2006.
3. Jon W.Mark and Weihua Zhqung , *Wireless communications and Networking*, PHI, 2005.
4. R.Blake, *Wireless communication Technology*, Thompson Asia Pvt.Ltd., 2004.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1464 – SPEECH PROCESSING

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

1. Course Description

Course Overview

This course deals with speech signals, their properties, parameters and applications. This course covers phonetic representation of speech, models for speech production, auditory masking, complex cepstrum, short-time cepstrum, computation of the cepstrum, recursive computation of the complex cepstrum and complete model of auditory processing. Spectral analysis, coding techniques and autocorrelation functions of speech signals are also covered in detail. This course will provide an opportunity to the student to do the minor and major projects in digital speech processing applications.

Course Pre/corequisites

1. A1403 – Signals and systems
2. A1425 – Digital Signal Processing

2. Course Outcomes (COs)

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

A1464.1 Summarize the concepts of speech signals and their applications.

A1464.2 Analyze the speech signals by using different transform techniques.

A1464.3 Distinguish between different cepstrums of speech signals.

A1464.4 Compare different speech coding techniques.

A1464.5 Contrast different speech prediction techniques.

3. Course Syllabus

UNIT - I

Fundamentals of Speech: The speech chain, applications of digital speech processing, phonetic representation of speech, models for speech production, hearing and auditory perception, the human ear, perception of loudness, critical bands, pitch perception, auditory masking, complete model of auditory processing.

UNIT - II

Short-Time Analysis of Speech: Short-Time Energy and zero-crossing rate, short-time autocorrelation function (STACF), Short-Time Fourier Transform (STFT), sampling the STFT in time and frequency, speech spectrogram, relation of STFT to STACF, short-time Fourier synthesis.

UNIT - III

Homomorphic Speech Analysis in time & frequency domain: Cepstrum and complex cepstrum, short-time cepstrum, computation of the cepstrum, recursive computation of the complex cepstrum,

short-time homomorphic filtering of speech, application to pitch detection, applications to pattern recognition, compensation for linear filtering, liftered cepstrum distance measures, Mel-frequency cepstrum coefficients.

UNIT - IV

Linear Predictive Analysis: Linear prediction and the speech model, computing the prediction coefficients, the Levinson–Durbin recursion, LPC spectrum, equivalent representations, LSP coefficients, cepstrum of vocal tract impulse response, PARCOR coefficients, log area coefficients.

UNIT - V

Digital Speech Coding: Sampling and quantization of speech, uniform quantization noise analysis, μ-law quantization, non-uniform and adaptive quantization, digital speech coding, the two-State excitation model, frequency-domain coders, Speech Enhancement.

Applications: Speech/speaker Recognition.

4. Books and Materials

Text Book(s)

1. Lawrence R. Rabiner and Ronald W. Schafer, *Introduction to Digital Speech Processing,* now Publishers Inc., 2007.

Reference Book(s)

1. Quatieri, Thomas F., *Discrete-Time Speech Signal Processing: Principles and Practice*, PHI, 2003.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1465 – LOW POWER VLSI DESIGN

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

1. Course Description

Course Overview

Low power design is a collection of techniques aimed at reducing overall dynamic and static power consumption of an Integrated Circuit. So, the study of a course on low power VLSI Design is essential for Electronics and Communication Engineering graduates. This course covers Sources of power dissipation, scaling the supply voltages, minimizing the capacitances for low power. This course also delivers knowledge on various software approaches to reduce power consumption. The knowledge provided by this course will be useful in understanding the need of low power for high speed VLSI circuits.

Course Pre/corequisite

A1426 – CMOS VLSI Design

2. Course Outcomes (COs)

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

A1465.1 Comprehend different sources of power dissipation.

A1465.2 Realize switched capacitance and arrive at ways to minimize.

A1465.3 Analyze and minimize dynamic and static power consumption in VLSI circuits.

A1465.4 Outline the working principles of adiabatic logic.

A1465.5 Establish ways to minimize power in software design.

3. Course Syllabus

UNIT - I

Sources of Power Dissipation: Short Circuit Power Dissipation, Switching Power Dissipation, Glitching Power Dissipation, Leakage Power.

Supply Voltage Scaling for Low Power: Device Feature Size Scaling, Architectural-Level Approaches, Voltage Scaling Using High-Level Transformations, Multilevel Voltage Scaling, Challenges in MVS, Dynamic Voltage and Frequency Scaling, Adaptive Voltage Scaling, Subthreshold Logic Circuits.

UNIT - II

Switched Capacitance Minimization: System-Level Approach: Hardware–Software Codesign, Transmeta's Crusoe Processor, Bus Encoding, Clock Gating, Gated-Clock FSMs, FSM State Encoding, FSM Partitioning, Operand Isolation, Precomputation, Glitching Power Minimization.

UNIT - III

Logic Styles for Low Power: Static CMOS Logic, Dynamic CMOS Logic, Pass Transistor Logic.

Leakage Power Minimization: Fabrication of multiple threshold voltages, VTCMOS Approach, Transistor Stacking, MTCMOS Approach, Power Gating, Isolation Strategy, State Retention Strategy, Dynamic Vth Scaling.

UNIT - IV

Adiabatic logic circuits: Adiabatic Charging, Adiabatic Amplification, Adiabatic Logic Gates, Pulsed Power Supply, Stepwise Charging Circuits.

UNIT - V

Low Power Software Approaches: Introduction, Machine-Independent Software Optimizations, Combining Loop Optimizations with DVFS- Loop Unrolling, Loop Tiling, Loop Permutation, Strength Reduction, Loop Fusion, Loop Peeling, Loop Un-switching.

4. Books and Materials

Text Book(s)

1. Ajit Pal, Low-Power VLSI Circuits and Systems, Springer, 2015.
2. J. Rabaey, Low Power Design Essentials, 1st Edition, Springer, 2010.

Reference Book(s)

1. Kaushik Roy and Sharat Prasad, Low-Power CMOS VLSI Circuit Design, Wiley Inter-science Publications, 2000.
2. Michael Keating, David Flynn, Robert Aitken, Alan Gibbons, Kaijian Shi, Low Power Methodology Manual for System-On-Chip Design, Springer, 2007.

Reference Online Resources

1. https://nptel.ac.in/courses/106105034/
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/
3. www.ece.ucdavis.edu/~vojin/CLASSES/EEC280

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1466 – DEVELOPMENT OF SECURE 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	30	70	100

1. Course Description

Course Overview

This course provides an introduction to embedded systems SECURITY. Focus is on security concepts, systems software considerations, secure embedded software development, embedded cryptography, data protection protocols. This course will be useful to students for development of secure embedded systems.

Course Pre/Corequisites

A1427 - Microprocessors and Microcontrollers

2. Course Outcomes (COs)

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

A1466.1 Analyze the embedded systems security concepts.

A1466.2 Utilize the systems software considerations for embedded security.

A1466.3 Make use of Development Tool Security to secure embedded software development.

A1466.4 Apply Cryptographic concepts for embedded systems security.

A1466.5 Analyze the data protection protocols.

3. Course Syllabus

UNIT - I

INTRODUCTION TO EMBEDDED SYSTEMS SECURITY: Introduction, Security Trends, Security Policies, Security Threats.

UNIT - II

SYSTEMS SOFTWARE CONSIDERATIONS: Role of the Operating System, Levels of Security, Microkernel versus Monolith, Core Embedded Operating System Security Requirements.

UNIT - III

SECURE EMBEDDED SOFTWARE DEVELOPMENT: Introduction, Minimal Implementation, Component Architecture, Least Privilege, Secure Development Process- Development Tool Security, Coding Standards.

UNIT - IV

EMBEDDED CRYPTOGRAPHY: Introduction, One-Time Pad, Cryptographic Modes, Block Ciphers, Authenticated Encryption

UNIT - V

DATA PROTECTION PROTOCOLS: Introduction, Data-in-Motion Protocols – Generalized Model, Choosing the Network Layer for Security, Ethernet Security Protocols, IPsec versus SSL, SSH, Secure Multimedia Protocols.

4. Books and Materials

Text Book(s)

1. David Kleidermacher, Mike Kleidermacher. *Embedded Systems Security,* 2nd Edition, Newnes, 2012.
2. Raj Kamal, *Embedded Systems Architecture, Programming and design*, 2nd Edition, TMH, 2006.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1467 – SATELLITE COMMUNICATIONS

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

1. Course Description

The extensive usage of satellite communication system in navigation applications has necessitated the students to have thorough knowledge of this system. The basic knowledge of various subsystems and access techniques provides the better understanding in the development of systems. This course deals with calculation of carrier to noise ratio and further means to improve the accuracy of the system.

Course Pre/corequisites

1. A1419 - Digital Communication Systems

2. Course Outcomes (COs)

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

A1467.1 Analyze the functionality of various elements of satellite communication system.

A1467.2 Apply launching procedures and Ephemeris data to place and locate satellite in the orbit.

A1467.3 Create link budgets to meet specific objectives for C/N.

A1467.4 Analyze the various GNSS constellations used for navigation.

A1467.5 Differentiate various access techniques used for communication.

3. Course Syllabus

UNIT - I

Orbital Mechanics and Launchers: Basic concepts of satellite communications, frequency allocations for satellite services .Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT - II

Satellite Subsystems: Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

UNIT - III

Satellite Link Design, Multiple Access: Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example. Frequency division multiple access (FDMA) Inter modulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and reception.

UNIT - IV

Earth Station Technology: Transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.

UNIT - V

Satellite Navigation & GNSS: Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, differential GPS, NavIC.

4. Books and Materials

Text Book(s)

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, Satellite communications, WSE, Wiley publications, 2nd Edition, 2003.
2. Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, *Satellite communications Engineering*, 2nd Edition, Pearson Publications, 2003.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1468 – PATTERN RECOGNITION

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 deals with the curve fitting and decision theory by introducing different linear regression models. Bayesian linear regression, linear models for classification, Bayesian logistic regression, Laplace approximation and predictive distribution for pattern recognition are discussed in detail. Different graph models and the process to extract interference are also covered. This course will provide an opportunity to the student to do minor and major projects in pattern recognition.

Course Pre/corequisites

1. A1425 – Digital Signal Processing
2. A1433 – Digital Image Processing

2. Course Outcomes (COs)

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

A1468.1 Analyze curve fitting and decision theory by using different distribution functions.

A1468.2 Compare different parameters of linear regression models.

A1468.3 Distinguish between different linear regression models.

A1468.4 Construct different graphical models for pattern recognition.

3. Course Syllabus

UNIT - I

Curve Fitting and Decision Theory: Polynomial curve fitting, Bayesian probabilities, Bayesian curve fitting, minimizing the misclassification rate, minimizing the expected loss, the reject option, inference and decision and loss functions for regression.

UNIT - II

Linear Models for Regression: Linear basis function models, maximum likelihood and least squares, geometry of least squares, sequential learning, regularized least squares, multiple outputs, Bayesian linear regression, parameter distribution, predictive distribution, equivalent kernel, Bayesian model comparison and limitations of fixed basis functions.

UNIT - III

Linear Models for Classification: Discriminant functions, two classes, multiple classes, least squares for classification, fisher's linear discriminant, relation to least squares, fisher's discriminant for multiple classes, the perceptron algorithm, maximum likelihood solution, Bayesian logistic regression, Laplace approximation and predictive distribution.

UNIT - IV

Graphical Models: Bayesian networks, polynomial regression, generative models, discrete variables, linear-Gaussian models, conditional independence, three node graphs, D-separation, Markov random fields, conditional independence properties, factorization properties, image de-noising, relation to directed graphs.

UNIT - V

Inference in Graphical Models: Inference on a chain, the marginal distribution, tree-structured graphs, factor graphs, directed graphs with the factorization, converting the polytree into an undirected graph, the sum-product algorithm, factorization of the sub graph, the max-sum algorithm, exact inference in general graphs, loopy belief propagation.

4. Books and Materials

Text Book(s)

1. Christopher M. Bishop, *Pattern Recognition and Machine Learning*, Springer 2006.

Reference Book(s)

1. Sergios Theodoridis, K Koutroumbas, *Pattern Recognition*, Academic Press, 4th Edition, 2009.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1469 – DIGITAL VLSI TESTING

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

1. Course Description

Course Overview

Testing is an integral part of the VLSI design cycle. With the advancement in IC technology, designs are becoming more and more complex, making their testing challenging. Testing occupies 60-80% time of the design process. A well-structured method for testing needs to be followed to ensure high yield and proper detection of faulty chips after manufacturing. Design for testability (DFT) is a matured domain now, and thus needs to be followed by all the VLSI designers. In this context, the course attempts to expose the students and practitioners to the most recent, yet fundamental, VLSI test principles and DFT architectures in an effort to help them design better quality products that can be reliably manufactured in large quantity.

Course Pre/corequisites

A1402 – Digital Logic Design

2. Course Outcomes (COs)

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

A1469.1 Detect faults occurring in digital systems and modelling of the faults to simplifying the detection.

A1469.2 Generate test vectors to detect and diagnose the faults using various algorithms.

A1469.3 Design testable Combinational and Sequential circuits using Logic BIST architectures

A1469.4 Develop testable circuits and find the output response of the stimulus compression.

A1469.5 Design testable memory units.

3. Course Syllabus

UNIT - 1

Introduction: Importance, Challenges, Levels of abstraction, Fault Models, Advanced issues.

Design for Testability: Introduction, Testability Analysis, DFT Basics, Scan cell design, Scan Architecture, Scan design rules, Scan design flow Fault Simulation: Introduction, Simulation models.

UNIT - 2

Fault Simulation: Logic simulation, Fault simulation.

Test Generation: Introduction, Exhaustive testing, Boolean difference, Basic ATPG algorithms, ATPG for non stuck-at faults, other issues in test generation.

UNIT - 3

Built-In-Self-Test: Introduction, BIST design rules, Test pattern generation, Output response analysis, Logic BIST architectures.

UNIT - 4

Test Compression: Introduction, Stimulus compression, Response compression.

UNIT - 5

Memory Testing: Introduction, RAM fault models, RAM test, Memory BIST Power and Thermal Aware Test: Importance, Power models, Low power ATPG, Power and Thermal Aware Test: Low power BIST, Thermal aware techniques.

4. Books and Materials

Text Book(s)

1. M.Abramovici, M.A.Breuer and A.D. Friedman, *Digital systems and Testable Design*, Jaico Publishing House, 2002.
2. P.K. Lala, *Digital Circuit Testing and Testability*, Academic Press, 2002.

Reference Book(s)

1. M.L.Bushnell and V.D.Agrawal, *Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits*, Kluwer Academic Publishers, 2002.
2. A.L.Crouch, *Design Test for Digital IC's and Embedded Core Systems*, Prentice Hall International, 2002.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1470 – EMBEDDED SYSTEMS DESIGN

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

1. Course Description

Course Overview

This course provides an introduction to embedded systems and their components. Focus is on interrupt handling, classification of Interrupts, memory related concepts, system boot methods, debouncing techniques, switch types, etc. This course will be useful to students in developing embedded systems projects.

Course Pre/Corequisites

1. A1427 - Microprocessors and Microcontrollers

2. Course Outcomes (COs)

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

A1470.1 Analyze the embedded systems components and microcontroller selection.

A1470.2 Distinguish interrupts in terms of their functions and applications.

A1470.3 Make use of memory addressing concepts to embedded system design.

A1470.4 Apply system boot concepts for embedded systems design.

A1470.5 Differentiate debouncing techniques and switch types.

3. Course Syllabus

UNIT - I

INTRODUCTION TO EMBEDDED SYSTEMS: Introduction, Embedded Systems Overview, General Versus Embedded System Design, Embedded Systems Examples, Components of Embedded Systems, Microprocessor Versus Microcontroller, Program And Data Memory, Microcontroller Selection Criteria.

UNIT - II

HANDLING INTERRUPTS: Introduction, Interrupts, Interrupts versus Polling, Classification of Interrupts, Interrupt Processing, and Interrupt Latency.

UNIT - III

MEMORY ADDRESSING: Introduction, Memory Classification, Memory Technologies, Memory Types, Memory Architecture, Memory Hierarchy, Memory Map, Handling Endianness

UNIT - IV

SYSTEM BOOT: Introduction, System Boot – Windows XP, Why Boot, Demystifying Reset Configuration Schemes, Challenges on Embedded Boot, Boot Rom.

UNIT - V

DE-BOUNCING TECHNIQUES: Introduction, Behaviour of a Switch, Switch Types, De-Bouncing Techniques, and Existing Solutions.

4. Books and Materials

Text Book(s)

1. Mohit Arora. *Embedded System Design - Introduction to SoC System Architecture*, Learning Bytes Publications, 2016.
2. Raj Kamal. Embedded Systems, 2nd Edition, Tata McGraw-Hill Education, 2011.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

OPEN ELECTIVES

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1181 – BASIC CIVIL ENGINEERING

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

1. Course Description

Course Overview

This course is designed to impart the basic knowledge about civil engineering to the students of other branches of engineering. The course includes materials for construction, basic surveying and other basic concepts ofirrigation, water supply and geotechnical engineering. It provides the significance of the civil engineering profession satisfying societal needs.

Course Pre/corequisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A1181.1 Classify various materials and components used in building construction.

A1181.2 List outdifferent domains like Structural, Transportation and Geotechnical Engineeringin Civil engineering stream.

A1181.3 Identify types of soils and foundations for various structures.

A1181.4 Measure the linear and angularparameters using concepts of surveying.

A1181.5 Develop water supply system for domestic and irrigational needs.

3. Course Syllabus

UNIT-I

Introduction to civil engineering & construction materials: Importance and scope of civil engineering, characteristics, types and their uses of stones, bricks, timber and cement

UNIT-II

Survey and highway engineering: Definition and classification of surveying, linear and angular measurements, leveling-modern instruments

UNIT-III

Modes of transportation: classification of highways - classification of pavements, curves, super elevation

UNIT-IV

Geotechnical engineering: Origin of soil, types of soil, bearing capacity of soil, types of foundation, shallow and deep

UNIT-V

Irrigation and water supply: Definition and classification of irrigation, irrigation structures, dams, weirs, cross drainage works, canal drops and quality of water-treatment methods

4. Books and Materials

Text Book(s)

1. B.C.Punmia, Ashok K Jain, Arun K Jain,*Basic Civil Engineering*, Laxmi Publications (P) Ltd,1st edition, 2003.
2. G K Hiraskar,*Basic Civil Engineering,* Dhanpat Rai Publication, 1st edition, 2004.

Reference Book(s)

1. K.R. Arora,*Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Delhi, 7th edition 2014.
2. B C Punmia Lal,*Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi, 16th edition, 2005.
3. Abe Kruger,*Green Building*,5th edition, 2012.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1182 – BUILDING PLANNING AND CONSTRUCTION

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

1. Course Description

Course Overview

The objective of the course is to learn about building by-laws laid by planning authorities, apply the principles and methods to be followed in constructing various components of abuilding & understand about masonry types in brick and stone construction. This course provides sequential approach towards constructional activities like flooring, carpentry, plumbing and electrical works etc.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1182.1 Plan buildings by adhering to laws laid by regulatory bodies.

A1182.2 Classify different masonry types of brick and stones used in construction.

A1182.3 Select appropriate floors and roofs for a proposed building.

A1182.4 Identify building materials which can be employed in construction.

A1182.5 Make use of damp proofing techniques to prevent ingress of water in buildings.

3. Course Syllabus

UNIT-I

Residential Buildings: Introduction,Different types of residential buildings- Detached house, semi-detached house, row house or chawls, block of flats or terrace house, duplex type houses, selection of site for residential building, factors effecting the selection of site, components of building, by-laws and regulations, orientation of buildings-factors effecting orientation, C.B.R.I suggestions for obtaining optimum orientation.

UNIT-II

Masonry: Stone masonry- definitions of terms used in masonry, materials for stone masonry, classifications of stone masonry, dressing of stones. Brick masonry - introduction, types of bricks, bonds in brick work, comparison of brick masonry and stone masonry. Composite masonry-introduction, stone composite masonry, brick-stone masonry, concrete masonry, hollow clay blocks masonry, reinforced brick masonry.

UNIT-III

Floors and Roofs: Ground floor- components of a floor, materials used for floor construction, different types of flooring,upper floors- introduction, steel joist and stone or precast concrete Slab floor, Jack arch floors, reinforced cement concrete floors, Ribbed or hollow tiled flooring, precast

concrete floors, timber floors, types of roofs- pitched roofs, single roofs, double or purlin roofs, trussed roofs.

UNIT-IV

Doors and Windows: Introduction, frame, shutters, head, sill, horn, rebate, location of doors and windows,size of doors and windows, types of doors, classifications of doors- arrangement of components, method or manner of construction, working operations, metal doors, types of windows, classifications of windows, ventilators, fixtures and fastenings, installing door and window frames.

UNIT-V

Damp proofing: Introduction, causes of dampness on buildings, effects of dampness on buildings, precautions, materials used for damp proofing, methods of damp proofing, DPC treatment in building problems, fire hazards, fire resisting properties of common building materials.

4. Books and Materials

Text Book(s)

1. Kumara Swamy N &Kameswara Rao A, *Building planning and Drawing*, Charotar Publishers, 6th Edition, 1998.
2. B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, *Building Construction*, Laxmi Publications, 10th Edition, 2008.

Reference Book(s)

1. S.K. Duggal, *Building Materials*, New Age International Publishers, 4th Edition, 2010.
2. D.N. Ghose, *Materials of construction*, Tata-McGraw-Hill Publishing Company Limited,1st Edition, 1989.
3. Sushil Kumar Sushil Kumar, (2003), *Engineering Materials*, Metropolitan Book Co., Private Ltd., New Delhi.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1183 – DISASTER MANAGEMENT

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

1. Course Description

Course Overview

This course provides knowledge on environmental hazards and disasters. The syllabus includes the basics of endogenous and exogenous hazards and gives a suitable picture on the different types of hazard and disasters. This course will enable the student to apply different management techniques to the hazards and disasters.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1183.1 Classify different kind of hazards/disasters and their effects on environment.

A1183.2 Analyze the causes of hazards/disasters which effects human life.

A1183.3 Apply disaster management through engineering applications.

A1183.4 Apply suitable mitigation measures to minimize the effects of hazards and disasters.

3. Course Syllabus

UNIT-I

Environmental Hazards and Disasters:meaning of environmental hazards, environmental, disasters and environmental stress, concept of environmental hazards, environmental, stress and environmental disasters, different approaches and relation with human ecology, landscape approach - ecosystem approach - perception approach - human ecology and its application in geographical researches.

UNIT-II

Types of Environmental Hazards and Disasters: Natural hazards and disasters, man induced hazards anddisasters, natural hazards- planetary hazards/disasters, extra planetary hazards/disasters, planetary hazards- endogenous hazards – exogenous hazards.

UNIT-III

Endogenous Hazards: Endogenous hazards, volcanic eruption, earthquakes, landslides, volcanic hazards/disasters - causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions, earthquake hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes, earthquake hazards in India, human adjustment, perception and mitigation of earthquake.

UNIT-IV

Exogenous Hazards/disasters: Exogenous hazards/disasters, infrequent events, cumulative atmospheric hazards/disasters infrequent events: cyclones, lightning, hailstormscyclones: tropical

cyclones andlocal storms, destruction by tropical cyclones and local storms (causes, distribution human adjustment, perception and mitigation) cumulative atmospheric hazards/disasters:floods-droughts, cold waves, heat waves. Floods:causes of floods, flood hazards India, flood control measures (human adjustment, perception and mitigation). Droughts:impacts of droughts, drought hazards in India, drought control measures, extra planetary hazards/disasters, man induced hazards/disasters, physical hazards/disasters-soil erosion.

UNIT-V

Soil Erosion: Mechanics and forms of soil erosion, factors and causes of soil erosion, conservation measures of soil erosion. Chemical hazards/disasters, release of toxic chemicals, nuclear explosion, sedimentation processes. Sedimentation processes:global sedimentation problems- regional sedimentation problems, sedimentation andenvironmental problems, corrective measures of erosion andsedimentation. Biological hazards/disasters:population explosion.

4. Books and Materials

Text Book(s)

1. Rajib Shah, *Disaster Management*, Universities Press, India, 2nd Edition, 2003.
2. Tushar Bhattacharya, *Disaster Science and Management*, TMH Publications, 1st Edition, 2012.

Reference Book(s)

1. Donald Hyndman & David Hyndman, *Natural Hazards & Disasters*, Cengage Learning, 4th Edition, 2013.
2. R.B. Singh (Ed), *Disaster Management*, Rawat Publication, New Delhi, 1st Edition, 2006.
3. Kates, B.I & White, *The Environment as Hazards*, G.F, Oxford Publishers, New York, 1978.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1184 – WATER RESOURCES CONSERVATION

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

1. Course Description

Course Overview

This course introduces the great need to conserve and plan the water resources in more efficient way because of urbanization and depletion of water resources. The course content enables the students to learn water hydrology, importance of water conservation and methods to conserve water resources.

Course Pre/corequisites

The Course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1184.1 Interpret ground and surface water utilization for conservation of water resources.

A1184.2 Apply the concepts of artificial ground water recharge to increase ground water level.

A1184.3 Make use of the concepts of harvesting for preservation of water.

A1184.4 Utilizenew technologies like ion exchange and UV radiation techniques to recycle and reuse waste water.

A1184.5 Plan efficient use of water resources with minimum energy.

3. Course Syllabus

UNIT-I

Ground and surface water utilization- Hydrologic cycle, water budget, ground water level fluctuations and environmental influence.

UNIT-II

Artificial ground water recharge- Concept and methods of artificial ground water recharge mounds and induced recharge, wastewater recharge for reuse, water spreading, farm ponds and percolation tanks.

UNIT-III

Water harvesting- Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, and check dams.

UNIT-IV

Reuse & recycle of waste water-Types of reuse, application of treated waste water, purity of reclaimed water, guidelines and regulations, new technologies used in recycling of waste water.

UNIT-V

Watershed management- Concept of watershed management, policies and decision making, concept of watershed development, objectives of watershed development, need for watershed development in India, integrated and multidisciplinary approach for watershed management.

4. Books and Materials

Text Book(s)

1. Ramakrishnan S.,*Ground water*, Sci -Tech Publications, 2nd edition, 2010.
2. B.C. Punmia& Pande B.B. Lal, *Irrigation and Water Power Engineering*; Laxmi Publications pvt. Ltd., New Delhi.

Reference Book(s)

1. S.N. Chatterjee,*Water Resources, Conservation and management*, Atlantic Publishers, 1st edition, 2018.
2. Murthy J.V.S, *Watershed Management*, New Age International Publishers, 2nd edition, 2017.
3. Murthy V.V.N*, Land and Water Management*, Kalyani Publications, 1st edition, 2018.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1281 – 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	30	70	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:

A1281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A1281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.

A1281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A1281.4 Test the Performance of DC machines, AC machines and single-phase transformers.

3. Course Syllabus

UNIT-I

DC Circuits: Circuit concept, types of network elements, ohm's law, types of sources voltage - current relationship for passive element (R,L&C), Kirchhoff's laws, network reduction techniques: series, parallel, combination of series and parallel, delta - star transformation, loop and nodal analysis.

Network Theorems: Thevenin's, Norton's, superposition and maximum power transfer theorems (DC excitation only).

UNIT-II

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

UNIT-III

D.C Generators: Constructional details of D.C. generator, principle of operation of D.C. generators, types of D.C generators, E.M.F equation.

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

UNIT-IV

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

UNIT-V

3-Phase Induction Motors: Principle of operation, types of induction motors, slip, torque equation, torque-slip characteristics.

3-phase Alternators: Principle of operation- constructional details-EMF equation.

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. A Sudhakar, Shyammohan S Palli, *Circuits and Networks*, Tata McGraw-Hill, 4th edition.
2. D. C. Kulshreshtha, *Basic Electrical Engineering*, McGraw Hill, 2009.
3. L. S. Bobrow, *Fundamentals of Electrical Engineering*, Oxford University Press, 2011.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1282 – RENEWABLE ENERGY SOURCES

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

1. Course Description

Course Overview

The purpose of this course is to enable the student to acquire knowledge on various Power Generation Systems. The primary objective of this course is to introduce solar energy, its radiation, collection, storage and application. It also deals with production of quality of energy, types of generation plants and their principles of operation, methods of energy storage and economics of generation.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1282.1 Apply the principles of Renewable energy sources for the construction of Power generating station.

A1282.2 Analyze the various energy conversion systems and their limitations.

A1282.3 Analyze Renewable energy sources for various environmental conditions.

A1282.4 Analyze the generation principles and operation of variety of sources of energy.

3. Course Syllabus

UNIT-I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, environmental impact of solar power, physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection, Storage and Applications: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. **Storage and Applications:** Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy and Bio Mass: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. engine operation and economic aspects.

UNIT-IV

Other Sources of Energy: Resources, types of wells, methods of harnessing the energy, potential in India. Ocean energy: OTEC, principles utilization, setting of OTEC plants, thermodynamic cycles.

Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Energy Storage and Economy: Energy storage - energy in transportation - Magneto hydrodynamic power generation- hydrogen economy

4. Books and Materials

Text Book(s)

1. G.D. Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 4th edition 2008.
2. JhonTwidell and tony Weir, *Renewable Energy Resources*, 2nd edition, Taylor and Francis Group,2006.

Reference Book(s)

1. Twidell&Weir, *Renewable Energy Sources*, Tata McGraw Hill Education Private Limited, New Delhi, 4th edition 2009.
2. S. N. Bhadra, D. Kastha& S. Banerjee, *Wind Electrical Systems* – Oxford University Press,2013.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1283 – ELECTRICALMEASURING INSTRUMENTS

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different electrical measuring instruments used to measure electrical quantities. The minimization of different errors and their effects in measuring instruments are discussed. Here the concepts of single phase and three phase circuits are discussed to determine the voltage, current, power and energy. Also, the concepts of bridges are discussed, which are used for the measurement of unknown resistance, inductance and capacitance. These electrical measuring instruments are used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1283.1 Categorise various electrical instruments used for measuring electrical parameters.

A1283.2 Design appropriate arrangement for extension of range in measuring instruments.

A1283.3 Analyze the errors and compensations in various electrical measuring instruments.

A1283.4 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.

A1283.5 Estimate the unknown quantities of resistance, inductance and capacitance using bridges.

3. Course Syllabus

UNIT-I

Measuring Instruments: Classification, deflecting, control and damping torques, ammeters and voltmeters,PMMC, moving iron and dynamometer type instruments, expression for the deflecting torque and control torque, errors and compensations, extension of range using shunts and Series resistance.

UNIT-II

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

UNIT-III

Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, double element and three element dynamometer wattmeter's, expression for deflecting and control torques, extension of range of wattmeter using instrument transformers, measurement of active and reactive powers in balanced and unbalanced systems.

UNIT-IV

Measurement of Energy: Single phase induction type energy meter, driving and braking torqueserrors and compensations, testing by phantom loading. Three phase energy meters.

UNIT-V

DC Bridges: Method of measuring low, medium and high resistance, Whetstone's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, loss of charge method, megger method.

AC Bridges: Measurement of Inductance, Maxwell's bridge, Anderson's bridge. Measurement of capacitance, Desauty's bridge, Schering bridge.

4. Books and Materials

Text Book(s)

1. A.K. Sawhney, *A course on Electrical and Electronics Measurements & Instrumentation*, DhanpatRai and Co. Publishers, 19th edition, 2015.
2. J.B. Gupta, *A course on Electrical and Electronics Measurements & Instrumentation*, S.K. Kataria publishers, 14thedition, 2014.

Reference Book(s)

1. U.A. Bakshi, A. V. Bakshi, *Electrical measurements and Instrumentation*, Technical publications, 1st edition, 2009.
2. E. W. Golding & F.C. Widdis, *Electrical Measurements and Measuring Instruments*, Wheeler publishers, 5th edition, 1997.
3. H S Kalsi, *Electronic Instrumentation*, Tata McGraw-Hill, 3rd edition, 2010.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1381 – 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	30	70	100

1. Course Description

Course Overview

This course deals with modelling and optimization of the problems with limited resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

Course Pre/corequisites

The course has no specific prerequisite and Corequisite

2.Course Outcomes (COs)

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

A1381.1 Apply various Operations Research models and methods to real world problems.

A1381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A1381.3 Evaluate various alternatives available to find optimal solution for real world problems.

A1381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A1381.5 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.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1382– MECHANICALTECHNOLOGY

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 provides knowledge to select the required material for different engineering applications. It also deals with basic concepts of internal combustion engines, compressors, power transmission systems and welding processes. The student will be able to apply the knowledge of engines, materials and welding processes which can be used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1382.1 Identify the types of engines and their cycles.

A1382.2 Classify the reciprocating air compressors and their working principles.

A1382.3 Discus the constructional features of domestic refrigeration and air conditioning systems.

A1382.4 Inspect the mechanism of power transmission elements of various engineering systems.

A1382.5 Select suitable engineering materials and welding methods for real time applications.

3. Course Syllabus

UNIT-I

I.C. Engines: working principle, 4 stroke and 2 stroke engines, comparison.

UNIT-II

Reciprocating Air compressors: Description and working of single stage and multistage reciprocating air compressors – inter cooling.

UNIT-III

Refrigeration systems: Study of household refrigerator, window air conditioner, split air conditioner ratings and selection criteria of above devices.

UNIT-IV

Transmission of power: Belt, rope, chain and gear drive.

UNIT-V

Engineering materials and welding processes: Engineering materials, properties of materials, gas welding, arc welding, soldering and brazing.

4. Books and Materials

Text Book(s)

1. R.S Khurmi & JS Gupta, *Thermal Engineering*, New Delhi S Chand, 2012.
2. P.L. Ballaney, *Refrigeration and Air Conditioning,* 2nd edition, 2012.

Reference Book(s)

1. R.K. Jain and S.C. Gupta, *Production Technology*, New Delhi, Khanna Publishers,2012.
2. S.N. Lal, *Elements of Mechanical Engineering*, Cengage Learning, 2013.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1383 – INTRODUCTIONTO AUTOMOBILE SYSTEMS

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

1. Course Description

Course Overview

This course provides a broad knowledge about the automobile mechanisms like transmission, final drive, braking system, front axle, steering, frame and chassis. It also covers emission and electrical systems used in automobiles. This knowledge will be helpful to the student in co-relating various systems with each other and understanding the individual systems in a better manner while using them in daily life.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1383.1 Identify the different parts of the automobile systems used in daily life.

A1383.2 Analyze brakes, steering, axles, suspension and frames of an engine for better performance.

A1383.3 Inspect the mechanism of power transmission elements, and applications of various engineering systems.

A1383.4 Compare the significance of various engines in terms of their performance.

A1383.5 Classify various electrical systems that are used for efficient functioning of automobiles.

3. Course Syllabus

UNIT-I

Introduction- History, industrial revolution, development in automobile industry, leading manufacturers.

UNIT-II

Classification of vehicles: On the basis of load, wheels, final drive, fuel used, position of engine and steering transmission, body and load, layout of an automobile chassis function of major components of a vehicle such as frame, transmission (clutch and gearbox), braking system, types of suspension, principle and its components.

UNIT-III

Introduction to thermodynamics: First and second laws of thermodynamics, Otto cycle, diesel cycle. Types of automotive fuels, properties of fuels, air requirement for complete combustion of fuel.

Introduction to IC engines: Concept of two stroke and four stroke petrol and diesel engines and their applications to automobiles, various terms, specification of automobile engines.

UNIT-IV

Emissions from automobiles – Pollution standards national and international, pollution control techniques, multipoint fuel injection for SI engines- common rail diesel injection, emissions from alternative energy sources– hydrogen, biomass, alcohols, LPG, CNG.

UNIT-V

Electrical system- Charging circuit, generator, current and voltage regulator, starting system, Bendix drive, mechanism of solenoid switch, lighting systems, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.

4. Books and Materials

Text Book(s)

1. Kirpal Singh, *Automotive Mechanics – Vol. 1 & Vol. 2*, Standard Publishers Distributors, 13th edition, 2013.
2. R.S Khurmi & JS Gupta, *Thermal Engineering*, New Delhi S. Chand, 2012.

Reference Book(s)

1. PL Ballaney, *Thermal Engineering*, New Delhi, Khanna Publishers,2013.
2. M.L. Mathur, F.S. Mehta and R.P. Tiwari, *Elements of Mechanical Engineering*, New Delhi, Jain Brothers,2013.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1481 – BASIC ELECTRONICS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

A1003 –Engineering Physics

2. Course Outcomes (COs)

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

A1481.1 Analyze the operation and characteristics of diodes and transistors.

A1481.2 Analyze various applications of diodes and transistors.

A1481.3 Make use of Boolean algebra postulates to minimize boolean functions.

A1481.4 Construct and analyze various combinational and sequential circuits used in digital systems.

3. Course Syllabus

UNIT-I

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

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

UNIT-II

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

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1482 – INTRODUCTION TO COMMUNICATION SYSTEMS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1482.1 Analyze the operation of basic communication system.

A1482.2 Compute the Fourier transform, energy and power of communications signals.

A1482.3 Compare the performance of different modulation schemes used in communication systems.

A1482.4 Differentiate time division and frequency division multiplexing techniques.

A1482.5 Select an appropriate modulation technique while designing a communication system.

3. Course Syllabus

UNIT-I

Operations on signals: Fourier series, Fourier transform, energy, power, bandwidth, sampling.

Communication Systems: Components, analog and digital messages, channel effect, signal to noise ratio and capacity.

UNIT-II

Modulation and Detection: Definition, transmission, multiplexing, demodulation.

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

UNIT-III

Angle Modulation: Phase modulation, frequency modulation.

Pulse Modulation: Pulse amplitude modulation (PAM), pulse width modulation (PWM) and pulse position modulation (PPM).

UNIT-IV

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

UNIT-V

Receivers and Multiplexing: AM receiver, FM receiver, frequency division multiplexing (FDM),

time division multiplexing (TDM).

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. Sham Shanmugam,*Digital and Analog Communication Systems*, Wiley-India edition,2006.
2. A. Bruce Carlson, and Paul B. Crilly,*Communication Systems,An Introduction to Signalsand Noise in Electrical Communication*, McGraw-Hill International Edition,5th edition, 2010.
3. Herbert Taub and Donald L Schilling,*Principles of Communication Systems*, Tata McGraw-Hill,3rd edition,2009.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1483 – FUNDAMENTALS OF IOT

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

1. Course Description

Course Overview

This course covers the development of internet of things (IoT) products and services including devices for sensing, actuation, processing and communication. This course helps the students to describe the technology around the Internet of Things (IoT). In this course students' study, python concepts, how to interface I/O devices, sensors using Arduino uno and raspberry pi. This course has simple examples with integration of techniques turned into an application.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2.Course Outcomes (COs)

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

A1483.1 Analyze IoTapplications using IoT enablers and connectivity layers, components.

A1483.2 Distinguish sensors and actuators in terms of their functions and applications.

A1483.3 Interface I/O devices, Sensors using Arduino UNO.

A1483.4 Develop Raspberry Pi Interfacing programs using python concepts.

A1483.5 Apply Raspberry Pi and Arduino Uno programming for IoT bases projects.

3. Course Syllabus

UNIT-I

Introduction to IoT: Characteristics of IoT, applications of IoT, IoT categories, IoT enablers and connectivity layers, IoT components.

UNIT-II

Sensors and Actuators: Sensors-definition, characteristics of sensor, classification of sensors, Actuators-definition, types of Actuators.

UNIT-III

Programming with Arduino: Introduction to Arduino UNO, Arduino IDE, Basic commands, serial commands. LED Interface, switch interface, serial interface, temperature sensor interface.

UNIT-IV

Python: Overview of Python, features, comments, variables, operators, data types, If statement, functions, for loop, while loop, strings, lists, tuples, dictionaries.

UNIT-V

Programming with Raspberry Pi: Introduction to Raspberry Pi, Installation of raspbian OS, connecting to laptop, terminal commands, LED Interface, button Interface, DHT sensor interface.

4. Books and Materials

Text Book(s)

1. Jeeva Jose,*Internet of Things,* 1st edition, Khanna Book Publishing, 2019.
2. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahindra Swain,*Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019.

Reference Book(s)

1. Vijay Madisetti, Arshdeep Bahga,*Internet of Things – A hands on Approach*, 1st edition, University Press, 2014.
2. Adrian McEwen, Hakim Cassimally,*Designing the Internet of Things*, 1st edition, John Wiley and Sons, 2014.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1581 –BASIC DATA STRUCTURES

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

1. Course Description

Course Overview

The aim of this course is to provide insight in organizing data types logically to access and configure the data. The concepts of linear and non-linear data structure algorithms are discussed. It improves the problem-solving ability of a learner to a great extent which can be applied in various fields of engineering.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

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

A1581.1 Analyze the time and space complexities of algorithms.

A1581.2 Apply various operations on linear data structures.

A1581.3 Design searching and sorting techniques for a given application.

A1581.4 Develop nonlinear programming for optimization techniques.

3. Course Syllabus

UNIT-I

Introduction and Overview: Definition, concepts of data structures, overview and implementation of data structures.

UNIT-II

Linear Data Structures: Stacks- Introduction, definition, representation of stack, operations on stacks, applications of stacks, queues-introduction, definition, representations of queues, various queue structures, applications of queues.

UNIT-III

Linked lists: Definition, single linked list, circular linked list, double linked list, circular double linked list, application of linked lists.

UNIT-IV

Sorting and Searching: Sorting- Bubble sort, selection sort, insertion sort, merge sort, quick sort, time complexity. Searching -sequential search, binary search, time complexity.

UNIT-V

Trees and Graphs: Trees- Examples, vocabulary and definitions, binary tree applications, tree traversals, binary search trees. Graphs-vocabulary and definitions, applications: BFS and DFS.

4. Books and Materials

Text Book(s)

1. Debasis Samanta,*Classic Data Structures*,2nd edition, PHI, 2014.

Reference Book(s)

1. G A Vijaya lakshmi Pai, *Data Structures and Algorithms*, TMH, 2008.
2. Horowitz, Sahni and Anderson Freed,*Fundamentals of Data Structures in C*, 2nd edition, Universities Press, 2012.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1582 – FUNDAMENTALS OF DBMS

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

1. Course Description

Course Overview

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

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

A1582.1 Apply suitable data models for given application.

A1582.2 Design database using integrity constraints and ACID properties.

A1582.3 Construct optimized SQL queries to solve real time problems.

A1582.4 Apply suitable normal form to eliminate data redundancy.

A1582.5 Choose appropriate index structure to improve performance.

3. Course Syllabus

UNIT-I

Introduction: Basics of database system applications, principle of database systems, view of data - data abstraction, instances and schemas, data models, database Languages - DDL, DML, ER diagrams.

UNIT-II

Relational Model: Fundamentals of relational model - Integrity constraints over relations, enforcing integrity constraints, querying relational data, logical data base design, views, ACID properties.

UNIT-III

SQL: Basic SQL queries, introduction to sub queries, correlated sub queries, set - comparison operators, aggregate operators, NULL values, logical operators, joins.

UNIT-IV

Normalizations: Redundancy issues, decompositions, functional dependencies, various normal forms.

UNIT-V

Data on External Storage: File organization and various indexing structures.

4. Books and Materials

Text Book(s)

1. Raghurama Krishnan, *Johannes Gehrke, Database Management Systems,*McGraw-Hill Education, 3rd edition, 2014.

Reference Book(s)

1. A. Silberschatz, H.F. Korth, Sudarshan, *Database System Concepts*, McGraw Hill, 6th edition, 2012.
2. RamezElmasri, Shamkat B. Navathe, *Database Systems,* Pearson Education, 6th edition 2009.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1583 – BASICS OF SOFTWARE ENGINEERING

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

1. Course Description

Course Overview

This course deals with engineering principles and programming languages applied in software development. These principles include analyzing user requirements, designing, building, and testing software. The knowledge acquired through this course is used to handle big projects efficiently with minimizing cost and reduced complexity.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1583.1 Apply the phases of software development life cycle in application development.

A1583.2 Identify software requirements for construction.

A1583.3 Design requirement engineering process for change management.

A1583.4 Apply the design concepts for design models.

A1583.5 Construct the various testing techniques for software systems.

3. Course Syllabus

UNIT-I

Introduction: Software engineering and process models: Introduction, changing nature of software, software myths.

UNIT-II

Process Models: Waterfall model, incremental process models, evolutionary process models, the unified process, agile process models.

UNIT-III

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, the software requirements document.

UNIT-IV

Requirement Engineering Process: Feasibility studies, requirements elicitation and analysis, requirement validation, requirement management.

UNIT-V

Design: Design process and design quality, design concepts-abstraction, information hiding, functional independence, refactoring, modularity, refinement, design classes, design model.

Testing: Testing strategies-A strategic approach to software testing, test strategies for conventional software, white box testing, black box testing, validation testing, system testing.

4. Books and Materials

Text Book(s)

1. Roger S. Pressman, *Software Engineering*, A Practitioner's Approach, McGraw Hill, International Edition, 8th edition, 2015.

Reference Book(s)

1. Sommerville, *Software Engineering*, Pearson education, 7th edition, 2008.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1584 –PYTHONFOR EVERYONE

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

1. Course Description

Course Overview

The aim of this course is to provide the fundamentals of Python language. It covers data types, operators, control statements, data structures, functions, modules, exception handling and file handling concepts. This course helps the student in selecting a domain path leading to software engineering in the segment of Artificial intelligence, Data Science and IoT.

Course Pre/Corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1584.1 Apply the basic constructs of Python to solve problems.

A1584.2 Organize lists, tuples and dictionaries appropriately to solve complex problems.

A1584.3 Build functions to increase code reusability.

A1584.4 Implement modular programming for organized software development.

A1584.5 Make use of exception handling for robust programming.

3. Course Syllabus

UNIT-I

Introduction to python programming: History of python, basics, python character set, tokens, data types, input and output functions, formatting numbers and strings, operators.

Control statements: Decision making statements, loop control statements, nested loops,break and continue statements.

UNIT-II

Data Structures: Sequence, lists, tuples, sets, dictionaries. Functional programming: filter (), map (), reduce (), python strings.

UNIT-III

Functions- Basics of functions, syntax, local and global scope of a variable, Recursions, lambda functions, parameters and arguments in functions.

UNIT-IV

Modules: The from…import statement, making your own modules, dir() function, the python module, modules and namespaces, packages, standard library modules.

UNIT-V

Exceptions: Introduction, handling exceptions, multiple except blocks, else clause, raising exceptions, finally block, re-raising exception.

File Handling: Introduction, need of file handling, text input and output files, seek function, binary files, extracting data from a file.

4. Books and Materials

Text Book(s)

1. Ashok Namdev Kamthane, Amit Ashok Kamthane,*Programming and problem solving with python,* McGraw-Hill Education, 2018.

Reference Book(s)

1. Martin C.Brown,*The Complete Reference: Python*, McGraw-Hill, 2018.
2. Reema Thareja,*Python programming using problem solving approach*, Oxford, 2019.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1585 – COMPUTER ORGANIZATION AND OPERATING SYSTEMS

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

1. Course Description

Course Overview

This course is a combination of computer organization and operating system concepts. It provides the concepts of Computer Architecture and Organization which focuses on register transfers, micro-operations and computer arithmetic concepts. Operating Systems covers the basic operating system abstractions, mechanisms, and their implementations. The learner of this course can choose his/her carrier as system architect or as system programmer.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1585. 1 Analyze the fundamentals of computer organization in designing a system.

A1585.2 Apply the concepts of programming language to solve system problems.

A1585.3 Make use of the Operating Systems design structure and its services for system programming.

A1585.4 Develop Process Scheduling algorithms and Inter-Process Communication systems for resource management.

A1585.5 Classify memory management techniques and virtual memory mechanisms for apt implementations.

3. Course Syllabus

UNIT-I

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input/output and interrupt, complete computer description, design of basic computer.

UNIT-II

Programming the Basic Computer: Introduction, machine language, assembly language, the assembler, programming arithmetic and logic operations.

UNIT-III

Operating Systems: Introduction, What operating systems do, operating system -structure, operations, services, user operating system interface, system calls, types of system calls.

UNIT-IV

Process Management: Process concept, process scheduling, scheduling criteria, scheduling algorithms, operations on processes, inter process communication, examples of IPC systems, process synchronization, critical section problem, semaphores, and monitors.

UNIT-V

Memory Management: Main memory-background, swapping, contiguous memory allocation, segmentation, paging, virtual memory-background, demand paging, page replacement, allocation of frames.

Deadlocks: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

4. Books and Materials

Text Book(s)

1. M. Morris Mano, *Computer system architecture*, Pearson Education, 5th edition, 2016.

Reference Book(s)

1. Willam Stallings, *Computer Organization and Architecture Designing for Performance*, Pearson, PHI, 6th edition, 2010.
2. Silberschatz, Galvin and Gagne, *Operating System Concepts*, 9th edition, 2013, Wiley India edition.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1586 – FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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

1. Course Description

Course Overview

This course provides the insight of basic Artificial Intelligence concepts along with fundamentals of machine learning, deep learning and neural networks. It covers math-heavy topics, such as regression and classification illustrated by Python examples. In addition, it also focuses on AI with search techniques and machine learning types. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

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

A1586.1 Analyze different fields in which AI is applied.

A1586.2 Apply suitable search strategies in finding better solution for a given problem.

A1586.3 Identify linear regression with single and multiple variables.

A1586.4 Perform predictive analysis using decision trees and random forest classifier.

A1586.5 Implement deep learning neural network models with TensorFlow.

3. Course Syllabus

UNIT-I

Principles of Artificial Intelligence: Introduction, fields and applications of artificial intelligence, AI tools and learning models, the role of python in artificial intelligence

UNIT-II

AI With Search Techniques: Introduction, heuristics, uniformed and informed search strategies, pathfinding with the A* Algorithm.

UNIT-III

Regression: Introduction, linear regression with one variable, linear regression with multiple variables, polynomial and support vector regression.

UNIT-IV

Classification: The fundamentals of classification, classification with support vector machines, introduction to decision trees, random forest classifier.

UNIT-V

Machine Learning with Neural Networks: Machine learning types, tensorflow for python, introduction to neural networks, deep learning.

4. Books and Materials

Text Book(s)

1. Zsolt Nagy, *Artificial Intelligence and Machine Learning Fundamentals*, Packt publishing, 2018.

Reference Book(s)

1. Dr. Dheeraj Mehrotra, *Basics of Artificial Intelligence & Machine Learning*, Notion Press, 1st edition 2019.
2. Neil Wilkins, *Artificial Intelligence: An Essential Beginner's Guide to AI, Machine Learning, Neural Networks, Deep Learning*, Bravex Publications, 2019.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1081 – MANAGEMENTSCIENCE

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

1. Course Description

Course Overview

The primary objective of this course is to provide the knowledge of Management in Success of Business. Further, students will be able to apply the Concepts, Theories, Principles of Management in various functional areas of an organization such as in Designing organization structures for managing the operations, Human Resource, Marketing and Production Departments. The student will able to evaluate cost and time of each business project by using PERT and CPM techniques and also formulate the new strategies that enhance competitive edge.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1081.1 Apply the concepts, theories, and principles of management in professional life.

A1081.2 Design suitable organization structure for managing the operations in the organization.

A1081.3 Apply principles of management to the various functional areas of an organization such as Human Resource, Marketing and Production.

A1081.4 Evaluate cost and time of each business project by using PERT and CPM techniques.

A1081.5 Formulate the new strategies that enhance competitive edge.

3. Course Syllabus

UNIT-I

Introduction to Management: Concept-Nature and importance of management, functions-evaluation of scientific management, modern management-motivation theories-leadership styles-decision making process-designing organization structure-principles and types of organization.

UNIT-II

Operations Management: Plant location and layout, methods of production, work-study-statistical quality control through control charts, objectives of inventory management, need for inventory control – EOQ&ABC analysis (simple problems)

Marketing Management: Meaning, nature, functions of marketing, marketing mix, channels of distribution - advertisement and sales promotion - marketing strategies - product life cycle.

UNIT-III

Human Resource Management: Significant and basic functions of HRM-Human Resource Planning (HRP), job evaluation, recruitment and selection, placement and induction-wage and salary administration,employee training and development – Methods - Performance appraisal - employee grievances - techniques of handling Grievances.

UNIT-IV

Strategic Management: Vision, mission, goals and strategy- corporate planning process-environmental scanning-SWOT analysis-Different steps in strategic formulation, implementation and evaluation.

Project Management: Network analysis-PERT, CPM, identifying critical path-probability-project cost analysis, project crashing.

UNIT-V

Contemporary Management Issues & Practices: Basic concepts of MIS-Materials Requirement Planning (MRP),Just-In-Time (JIT) system, Total Quality Management(TQM)-Six Sigma and Capability Maturity Models (CMM) evies, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing(BPO), business process re-engineering, bench marking, and balance score card.

4. Books and Materials

Text Book(s)

1. A.R Aryasri, *Management Science,*4th edition, New Delhi: Tata McGraw Hill, 2013.

Reference Book(s)

1. Ashima B. Chhalill, P. Vijaya Kumar, N. AppaRaohalill, *Introduction to Management Science*, 1stedition, New Delhi: Cengaage, 2012.
2. Vijay Kumar &Apparo: *Introduction to Management Science*, New Delhi Cengage, 2011.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1082 – RESEARCHMETHODOLOGY

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1082.1 Interpret the importance of literature survey to identify the research problem.

A1082.2 Develop suitable research methodologies to conduct engineering research.

A1082.3 Apply the principles of research to gather the required data from various sources.

A1082.4 Evaluate the gathered data by using appropriate statistical techniques.

A1082.5 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 designedfor

sampling, some important sampling definitions, estimation of population, role of statistics for data analysis, parametric v/s non-parametric methods, descriptive statistics, measures of central tendency and dispersion, hypothesis testing, use of statistical software. Data analysis: deterministic and random data, uncertainty analysis, tests for significance: chi-square, student's t-test, regression modeling, direct and interaction effects, anova, F-test, time series analysis, autocorrelation and autoregressive modeling.

UNIT-V

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1083– INTELLECTUALPROPERTY RIGHTS

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

1. Course Description

Course Overview

The primary objective of the course is to have a general understanding of the basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Issues related to Patents.The Course addresses the means of innovations with an emphasis on trade secret that are necessary to obtain IPR through protect their innovations. It also encourages the students to take up innovations and establish start-ups.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1083.1 Analyze ethical and professional issues which arise in the intellectual property law context.

A1083.2 Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.

A1083.3 Analyze the social impact of intellectual property law and policy.

A1083.4 Make use of copyrighted material so that it does not obstruct the progress of human knowledge.

A1083.5 Analyze IPR policies before filing patentable inventions and discoveries.

3. Course Syllabus

UNIT-I

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III

Law of Copy Rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: foundation of patent law, patent searching process, ownership rights and transfer.

UNIT-IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: misappropriation right of publicity, false advertising.

UNIT-V

New Developments of Intellectual Property: New developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

4. Books and Materials

Text Book(s)

1. K Bansal& P Bansal, *Fundamentals of Intellectual Property for Engineers,* BS Publications, ISBN: 9788178002774, 8178002779, Edition: 2013.

Reference Book(s)

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks Copyrights Patents and Trade Secrets*, 4th Edition, New Delhi: Cengage India, 2015, ISBN:9788131528976.
2. Prabuddha Ganguli, *Intellectual Property Rights– Unleashing the Knowledge Economy,* McGraw Hill Education; 1st Edition, 1st July 2017.
3. Integrating Intellectual Property Rights and Development Policy: *Report of the Commission on Intellectual Property Rights,* London September 2002 (web source: http://www.iprcommission.org/papers/pdfs/final_report/ciprfullfinal.pdf).

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1084 –NATIONALSERVICE SCHEME

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

1. Course Description

Course Overview

The main objectives of National Service Scheme (NSS) are : understand the community in which they work, understand themselves in relation to their community, identify the needs and problems of the community and involve them in problem-solving, develop among themselves a sense of social and civic responsibility, utilize their knowledge in finding practical solutions to individual and community problems, develop competence required for group-living and sharing of responsibilities, gain skills in mobilizing community participation, acquire leadership qualities and democratic attitudes, develop capacity to meet emergencies and natural disasters and, practice national integration and social harmony

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1084.1 Classify the organizational structure of NSS and its activities.

A1084.2 Identify the methods of mobilization and importance of youth Leadership.

A1084.3 Develop a sense of social and civic responsibility and provide solutions to individual and community problems.

A1084.4 Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions.

A1084.5 Develop capacity to meet emergencies and natural disasters.

3.Course Syllabus

UNIT-I

Introduction and Basic Concepts of NSS - History, philosophy, aims & objectives of NSS, Emblem, flag, motto. Song, badge etc., Organizational structure, rules and responsibilities of various NSS functionaries.

UNIT-II

NSS Programmes and Activities - Concept of regular activities, special camping, Day Camps, basis of adoption of village/slums.Methodology of conducting Survey, financial pattern of the scheme, other youth prog./schemes of Goal, coordination with different agencies, maintenance of the Diary.

UNIT-III

Understanding Youth - Definition, profile of youth, categories of youth, issues, challenges and opportunities for youth, youth as an agent of social change.

Importance and Role of Youth Leadership -Meaning and types of leadership, qualities of good leaders; traits of leadership, importance and rule of youth leadership.

UNIT-IV

Community Mobilization- Mapping of community stakeholders, designing the message in the context of the problem and the culture of the community, identifying methods of mobilization.

UNIT-V

Volunteerism and Shramdan: Indian Tradition of volunteerism, needs & importance of volunteerism, motivation and constraints of volunteerism, shramdan as a part of volunteerism.

4. Books and Materials

Reference Book(s)

1. Khwajala Ghulama Saiyidain, *National Service Scheme: A Report*, Published by Ministry of Education, Govt. of India, 1961.
2. N. F. Kaikobad, Krishan K. Kapil, *Training and consultancy needs in national service scheme*, Published by the Tata Institute of Social Sciences (TISS), 1971.
3. *National Service Scheme: guide-lines to project-masters*, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971.

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1085 – YOGA

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

1. Course Description

Course Overview

Yoga is an invaluable gift of ancient Indian tradition. It embodies unity of mind and body; thought and action; restraint and fulfilment; harmony between man and nature and a holistic approach to health and well-being. Yoga is not about exercise but to discover the sense of oneness with ourselves, the world and Nature. By changing our lifestyle and creating consciousness, it can help us to deal with climate change. Stress and Depression have become silent killers. Yoga offers a solution to these ailments. Practicing Yoga helps fight stress and find peace. All you need is willingness to practice it.

Course Pre/corequisites

There is no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1085.1 Improve physical conditioning related to flexibility through participation in yoga.

A1085.2 Develop and maintain a personal yoga practice.

A1085.3 Recognize and apply the value and benefits of an on-going yoga practice.

A1085.4 Select asanas appropriate for personal needs.

A1085.5 Identify and apply relaxation techniques for stress reduction.

3.Course Syllabus

UNIT-I

Introduction of human body and its systems, definition of anatomy and physiology and importance in yogic practices, respiratory system, digestive system, endocrine system. Origin of yoga & its brief development, meaning of yoga & its importance, yoga as a science of art (yoga philosophy), meaning of meditation and its types and principles.

UNIT-II

Classification of yoga/types of yoga - hatha yoga, raja yoga, laya yoga, bhakti yoga, gyan yoga, karma yoga, asthang yoga.

UNIT-III

Classification of asanas and its mechanism, cultural asana (standing, sitting, supinline, praline position & topsy-turvy), meditative asana and relaxative asana, nervous system, circulatory system.

UNIT-IV

Introduction of Kriya, bandha and mudra, importance of KRIYA and its scientific approach, importance of BANDHA and its scientific approach, importance of MUDRA and its scientific approach.

UNIT-V

Effect of asanas on various systems, difference between asana and exercise, difference between pranayama and deep breathing and yogic diet.

4.Books and Materials

References:

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

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1086 – DESIGN THINKING

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

1. Course Description

Course Overview

This course introduces design thinking and its application to developing new products, services, and the organization of businesses. Design thinking is a human-centric, interdisciplinary approach towards innovation. Design thinking as practiced in this course blends creative thinking and logical or rational thinking, and involves a process consisting of empathizing, ideating, and prototyping. Students will learn design principles, methodologies, and frameworks, and apply them through exercises and projects. The course is divided into four main aspects, all interconnected but which we also separately emphasize. They are: (1) design methodologies, (2) the "thing" to be designed (i.e., products, services, or the business itself, e.g. the business model), (3) human attitudes and behaviors (towards the designs), and (4) design contexts.

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1086.1 Appreciate various design processes for creativity and innovation.

A1086.2 Develop design ideas through different techniques.

A1086.3 Identify the significance of reverse engineering about products.

A1086.4 Make use of design drawings to communicate ideas effectively.

A1086.5 Build organizations that support creative and innovative thinking.

3. Course Syllabus

UNIT-I

Introduction to design thinking, definition, why is design thinking important, how is design thinking different, process of design - introduction – product life cycle - design ethics, creativity, innovation and design, design process - creativity and innovation in design process - design limitation, preparing mind for innovation-the physics of innovation.

UNIT-II

Idea generation- The idea, generation process, mind mapping tool.Experimentation-What works, learning launch tool, strategic opportunities, creative people, creative organizations, ideas, and tools to help both people and organizations work more creatively.

UNIT-III

Creative thinking - generating design ideas - lateral thinking –analogies – brainstorming - mind mapping - national group technique – synectic's - development of work - analytical thinking - group activities recommended.

UNIT-IV

Reverse engineering - introduction - reverse engineering leads to new understanding about products -reasons for reverse engineering - reverse engineering process - step by step – case study.

UNIT-V

Basics of drawing to develop design ideas- introduction - many uses of drawing - communication through drawing – drawing basis – line - shape/ form – value – colour – texture –overview of drawing -practice using auto cad recommended.

4. Books and Materials

Text Book(s)

1. John.R.Karsnitz, Stephen O 'Brien and John P. Hutchinson, *Engineering Design*, Cengage learning (International edition) Second Edition,2013.
2. Yousef Haikand Tamer M. Shahin, *Engineering Design Process*, Cengage Learning, Second Edition, 2011.

Reference Online Resources

1. https://courses.edx.org/register?course_id=coursev1%3AUQx%2BCORPINN1x%2B2T2020&enrollment_action=enroll&email_opt_in=false
2. https://www.coursera.org/programs/coursera-response-program-for-pcek-brht?collectionId=&productId=bfnQqUbbEeeMtBKozo_2UA&productType=coure&showMiniModal=true
3. www.tutor2u.net/business/presentations/.../productlifecycle/default.html orhttps://www.mindtools.com/brainstm.html
4. https://www.quicksprout.com/.../how-to-reverse-engineer-your-competit www.vertabelo.com/blog/documentation/reverse-engineeringhttps://support.microsoft.com/en-us/kb/273814
5. https://support.google.com/docs/answer/179740?hl=en https://www.youtube.com/watch?v=2mjSDIBaUlMthevirtualinstructor.com/foreshortening.html
6. https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdfwww.bizfilings.com›Home › Marketing› Product Development
7. https://canvas.uw.edu/courses/1023376/assignments/syllabus

GPULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1087 – ENTREPRENEURSHIPDEVELOPMENT

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1087.1 Analyze the nature of entrepreneurship, risk and reward in modern business scenario.

A1087.2 Identify the business challenges and opportunities by various case studies.

A1087.3 Assess the promotion and institutional support by various agencies in India.

A1087.4 Evaluate the role of angel investors in promotion and expansion of start-ups in India.

A1087.5 Prepare effective and feasible project proposals and project reports.

3. Course Syllabus

UNIT-I

Introduction to Entrepreneurship: Introduction to entrepreneurship definition types of entrepreneur, entrepreneurial traits, Entrepreneur vs. Manager, Entrepreneur Vs Intrapreneur, Entrepreneurial decision process, Ethics and social responsibility of entrepreneurs, Opportunities for entrepreneurs in India and abroad. Creating and starting the venture, sources of new ideas, methods of generating ideas, creative problem solving, and product planning and development process.

UNIT-II

Business Plan: The business plan nature and scope of business plan, writing business plan, evaluating business plans, using and implementing business plans, Marketing plan, financial plan, the organizational plan and Launching formalities.

UNIT-III

The Financing & managing New Venture: Financing and managing the new venture, sources of capital, venture capital, angel investment, record keeping, recruitment, motivating and leading

teams, financial controls, Marketing and sales controls, E-commerce, entrepreneurship and internet advertising.

UNIT-IV

The new Venture Expansion Strategies: New venture expansion strategies and issues, features and evaluation of joint ventures, acquisitions, mergers, franchising. Public issues, rights issues, bonus issues and stock splits. Choosing location and layout, Issues related to selection of layout.

UNIT-V

Production & Marketing Management: Production and Marketing Management: thrust of production management, selection of production techniques, plant utilization and maintenance, designing the work place, inventory control, material handling and quality control, Marketing functions, market segmentation, market research and channels of distribution, sales promotion and product pricing, global aspects of entrepreneurship.

4. Books and Materials

Text Books:

1. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management,* Sixth edition, Himalaya Publishing House, New Delhi, 2011.

Reference Books:

1. Poornima M Charantimath, *Entrepreneurship Development and Small Business Enterprises,* 2nd Edition, Pearson Education India: Bengaluru, August 2013.
2. S.S. Khanka, *Entrepreneurial Development*, 2nd Edition, S Chand Publishing: New Delhi, ISBN: 9788121918015, 2014.
3. Robert D Hisrich, Michael P Peters and Dean A Shepherd, *Entrepreneurship*, 6th Edition, TATA McGraw-Hill: New Delhi, 2007.