

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

ELECTRICAL AND ELECTRONICS ENGINEERING

Under R20 Regulations

B. Tech. - Regular Four-Year Degree Program

(For batches admitted from the Academic Year 2020 - 2021)

&

B. Tech. - Lateral Entry Scheme

(For batches admitted from the Academic Year 2021 - 2022)

G. Pullaiah College of Engineering and Technology

(Autonomous)

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

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

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS
GPCET – R20

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

Preliminary Definitions and Nomenclature

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Award of B.Tech. Degree

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

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

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

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

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

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

3. Courses of study

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

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

4. Credits:

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

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

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

5. Course Structure

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

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

6. Weightage for course evaluation

6.1 Course Pattern

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

6.2 Evaluation Process

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

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

6.3 Internal Examinations:

i. For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination consists of objective paper for 5 marks and subjective paper for 30 marks with duration of 1 hour 40 minutes (10 minutes for Objective paper and 90 minutes for subjective paper). The marks obtained in subjective paper will be condensed to 20 marks. The remaining 5 marks shall be awarded based on the submission of assignments by the student. A student has to submit two assignments in every subject each for 5 marks.

ii. The objective paper shall consist of 10 objective questions each carrying 0.5 Mark.

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

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

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

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

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

6.4 End Examinations:

End examination of theory subjects shall have the following pattern:

There shall be 6 questions and all questions are compulsory. Question 1 shall contain 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.

6.5 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 faculty and senior expert in the same subject of the department.

In a practical subject consisting of two parts (Eg: Electrical & Mechanical Lab), the end examination shall be conducted for 35 marks in each part. Internal examination shall be evaluated as above for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.12 Honors degree in a discipline:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7. Attendance Requirements:

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

8. Minimum Academic Requirements:

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

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

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

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

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

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

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

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

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

9. Course Pattern:

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

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

(ii) **With–holding of Results**:

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

(iii) **Grading**

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

Table – Conversion into Grades and Grade Points assigned

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

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

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

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

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

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

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

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

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

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

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

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

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

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

11. Award of Class:

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

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

12. Gap Year:

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

13. Transitory Regulations:

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

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

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

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

16. Rules of Discipline

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

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

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

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

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

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

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

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

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

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

(xi) Dress Code

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

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

17. Punishments for Malpractice cases – Guidelines

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

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

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

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

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

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

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

1. Award of B.Tech. Degree

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

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

2. Minimum Academic Requirements:

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

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

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

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

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

3. Course Pattern

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

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

5. Award of Class:

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

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

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

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

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

FIRST YEAR B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)

0 SEMESTER (I YEAR)									
S.No	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
20SIP01	Physical Activities - Sports, Yoga and Meditation, Plantation	MC	0	0	6	0	-	-	-
20SIP02	Career Counselling	MC	2	0	2	0	-	-	-
20SIP03	Orientation to all branches - career options, tools, etc.	MC	3	0	0	0	-	-	-
20SIP04	Orientation on admitted Branch - corresponding labs, tools and platforms	EC	1	0	4	0	-	-	-
20SIP05	Proficiency Modules & Productivity Tools	ES	2	1	2	0	-	- http://www.gpcet.ac.in/	-
20SIP06	Assessment on basic aptitude and mathematical skills	MC	1	0	4	0	-	-	-
20SIP07	Remedial Training in Foundation Courses	MC	2	1	2	0	-	-	-
20SIP08	Human Values & Professional Ethics	MC	3	0	0	0	-	-	-
20SIP09	Communication Skills - focus on Listening, Speaking, Reading, Writing skills	BS	2	1	2	0	-	-	-
		TOTAL	16	3	22	0			-

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

PROGRAMMECURRICULUM STRUCTURE UNDER R20 REGULATIONS

FIRST YEAR B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)

I SEMESTER (I YEAR)

S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30002	Mathematics-I	BS	3	0	0	3	30	70	100
A30005	Chemistry	BS	3	0	0	3	30	70	100
A30501	Python Programming	ES	3	0	0	3	30	70	100
A30201	Fundamentals of Electrical Engineering	ES	3	0	0	3	30	70	100
A30302	Engineering Workshop	ES	1	0	4	3	30	70	100
A30502	Python Programming Lab	ES	0	0	3	1.5	30	70	100
A30009	Chemistry Lab	BS	0	0	3	1.5	30	70	100
A30202	Fundamentals of Electrical Engineering Lab	ES	0	0	3	1.5	30	70	100
	TOTAL		**13**	**00**	**13**	**19.5**	**240**	**560**	**800**

II SEMESTER (I YEAR)

S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30010	Mathematics-II	BS	3	0	0	3	30	70	100
A30004	Applied Physics	BS	3	0	0	3	30	70	100
A30503	Data Structures using C	ES	3	0	0	3	30	70	100
A30001	Communicative English	HS	3	0	0	3	30	70	100
A30301	Engineering Graphics & Computer Aided Drafting	ES	1	0	4	3	30	70	100
A30008	Applied Physics Lab	BS	0	0	3	1.5	30	70	100
A30504	Data Structures Lab	ES	0	0	3	1.5	30	70	100
A30006	Communicative English Lab	ES	0	0	3	1.5	30	70	100
A30031	Environmental Science	MC	2	0	0	0	100*	-	100*
	TOTAL		**15**	**00**	**13**	**19.5**	**240**	**560**	**800**

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

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

A30002 – MATHEMATICS – I

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

1. Course Description

Course Overview

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

Course Pre/co requisites

- Linear Algebra
- Differentiation
- Integration

2. Course Outcomes (COs)

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

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

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

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

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

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

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

3. Course Syllabus

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

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

UNIT-II: Quadratic forms

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

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

UNIT-III: Multivariable Calculus

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

UNIT-IV: Double Integrals

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

UNIT-V:Triple Integrals and Special Functions

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

4. Books and Materials

Text Books:

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

Reference Books:

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

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

A30005 – CHEMISTRY

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

1. Course Description

Course Overview

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

Course Pre/Co requisites

Bridge Course

Course Outcomes (COs)

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

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

2. Course Syllabus

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

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

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

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

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

3. Books and Materials

Text Books:

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

Reference Books:

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

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

A30501 – PYTHON PROGRAMMING

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

1. Course Description

Course Overview

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

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

Course Pre/Co-requisites

The course has no specific prerequisite and co- requisites.

2. Course Outcomes (COs)

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

A30501.1	Comprehend the fundamental concepts of computer hardware and problem solving Abilities.
A30501.2	Knowledge on the basic concepts of algorithms, flow charts and python programming.
A30501.3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.
A30501.4	Interpret the importance of functions in programming
A30501.5	Analyze and modularize the problem and its solution by using functions.
A30501.6	Ability to relate the concepts of strings, files and pre-processors to the real world Applications.

3. Course Syllabus

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

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

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

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

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

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

Functions -Basics of functions, syntax, use of a function, local and global scope of a variable, return statement, recursive functions, lambda functions, parameters and arguments in functions.
Modules -The from…import statement, Name of Module, Making your own Modules, dir() function, The Python Module, Modules and Namespaces, Packages in Python, Standard Library modules, Globals(), Locals() and Reload(), Function Redefinition.
Exceptions -Introduction, Handling Exceptions, Multiple Except Blocks, else Clause, Raising Exceptions, finally Block, Re-raising Exception.
File Handling -Introduction, Need of file handling, text input and output files, seek function, binary files. Extracting data from a file and performing some basic operations on it.

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

OR

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

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

A30201 – 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 introduces the basic concepts of circuit elements which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basics of circuits which includes Electromagnetic laws, Kirchhoff's laws, Fundamentals of AC Circuits, various types of wires, cables, Batteries and wiring systems.

Course Pre/Co-requisites:

The course has no specific prerequisite and co- requisites.

2. Course Outcomes (COs)

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

A30201.1	Understand the basic concepts of magnetic circuits, electro magnetism and Electrostatics.
A30201.2	Understand and analyse DC circuits and their transformations.
A30201.3	Understand and analyse the concepts of AC fundamental circuits.
A30201.4	Apply KCL and KVL for mesh and nodal analysis
A30201.5	Understand the Knowledge of electromagnetism and its principles.
A30201.6	Understand the basic types of wires, cables, Batteries and wiring systems

3. Course Syllabus

UNIT-I

Elementary Concepts:

Concept of Potential difference, Current and resistance, Ohm's law, effect of temperature on resistance, resistance temperature coefficient, insulation resistance. SI units of work Power and Energy. Conversion of energy from one form to another in electrical and thermal systems.

UNIT-II

D. C. Circuits (Only Independent sources):

Kirchhoff's law, ideal and practical voltage and current sources. Mesh and Nodal analysis (Super node and super Mesh excluded).Source transformation, Star delta transformation, Mesh and Nodal analysis.

UNIT-III

A.C. Fundamentals:

Sinusoidal voltage and currents, their mathematical and graphical representation, concept of cycle period, frequency, instantaneous, peak, average, r.m.s. values, peak factor , and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors.

Study of A.C circuits of pure resistance, inductance and capacitance and corresponding voltage- current phasor diagrams, voltage – current and power waveforms.

UNIT-IV

Electromagnetism:

Concepts of m.m.f, flux, flux density, reluctance, permeability and field strength, their units and relationship. Simple series and parallel magnetic circuits., right hand thumb rule and cork screw rule. Fleming's left hand rule, Fleming's right hand rule, Faraday's law of electromagnetic induction, Lenz law, comparison between electrical and magnetic circuits , force on current carrying conductor placed in magnetic field, statically and dynamically induced EMF's, self and mutual inductance,, Magnetic effect of electrical current cross and dot convention, coefficient of coupling, energy stored in magnetic field.

UNIT-V

Electrical Installations:

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, house wiring connections, Earthing. Types of Batteries, Important Characteristics for Batteries.Elementary calculations for energy consumption.

4. Books and Materials

Text Book(s):

1.V. N. Mittal and Arvind Mittal," *Basic Electrical Engineering*" McGraw Hill,2011.

2. S. Onori, L. Serrao and G. Rizzoni, *Hybrid Electric Vehicles*: *Energy Management Strategies*, Springer, 2015.

3.Edward Hughes, "*Electrical and Electronics Technology*"10th edition 2008,Pearson Education.

4.E.L.Donnelly "*Electrical Installation theory and practice*" third edition published by Thomas Nelson and Sons Ltd 1985.

Reference Book(s):

1. L. S. Bobrow, "*Fundamentals of Electrical Engineering*", Oxford University Press,2011.
2. D. C. Kulshreshtha, "*Basic Electrical Engineering*", McGraw Hill, 2009.

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

A30302 – ENGINEERING WORKSHOP

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

1. Course Description

Course Overview

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

Course Pre/Co-requisites

This course has no Pre/co-requisites

2. Course Outcomes (COs)

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

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

3. Course Syllabus

1. **FittingTrade–**Making of aL-fitfromthegivenM.SFlatmaterialpiece.
2. **FittingTrade–**Making of aSquare joint fromthegivenM.SFlatmaterialpiece.
3. **CarpentryTrade–**Making of acrosslapjointasperspecification.
4. **CarpentryTrade-**Tomakea dovetail jointasperspecification.
5. **TinSmithy–**Making of an openscoopwiththegivensheetmetal
6. **TinSmithy–**Making of asquare tin withthegivensheetmetal
7. **Foundry:**Preparation of asandmouldusingasinglepiecepattern
8. **Welding**: Preparation of a single V butt joint
9. **Welding**: Preparation of single lap joint
10. **House Wiring:** One bulb connected by oneone-way switch
11. **House Wiring:** One bulb connected by two Two- way switches

12. **House Wiring:** Staircase-wiring
13. **House Wiring:**Tubelightwiring
15. **House Wiring:** Go-DownWiring

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Text Book(s)

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

Reference Book(s)

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

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

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

A30502 – PYTHON PROGRAMMING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

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

Course Pre/Co-requisites

A30501-Python Programming

2. Course Outcomes (COs)

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

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

A30502.2 Understand and implement modular approach using python

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

A30502.4 Understands about files and its applications.

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

A30502.6 Select appropriate programming construct for solving the problem

3. Course Syllabus

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

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

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

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

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

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

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

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

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

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

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

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Text Book(s)

1. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd edition, O’Reilly, 2016.
Or
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

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

A30009 – CHEMISTRY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

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

Course Pre/co requisites:

A30005-Chemistry

2. Course Outcomes (COs)

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

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

3. Course Syllabus

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

4. Laboratory Requirements

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

5. Books and Materials

Reference Book(s):

1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's *Quantitative Chemical Analysis* 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani *Laboratory Manual on Engineering Chemistry* 3/e, Dhanpat Rai Publishing Company (2007).

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

A30202 – FUNDAMENTALS OF ELECTRICAL ENGINEERING 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

2. Course Description

Course Overview

This course introduces the basic concepts of circuit elements which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basics of circuits which includes Electromagnetic laws, Kirchhoff's laws, various types of wires, cables, Batteries, wiring systems and demonstration of DC/AC Machines.

Course Pre/Co-requisites:

A30201-Fundamentals of Electrical Engineering

2. Course Outcomes (COs)

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

A30202.1 Understand the basic concepts of electrical elements.

A30202.2 Understand and analyses the basic laws.

A30202.3 Understand and apply the connections of series and parallel circuits.

A30202.4 Understand and apply the KCL and KVL.

A30202.5 Understand and apply the basic wiring systems.

A30202.6 Demonstration of parts of DC and AC Machines.

3. Course Syllabus

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, inductors and capacitors
2. Verification of ohms law
3. Verification of Faradays law of Electromagnetic induction.
4. Verification of Kirchhoff laws
5. Series Connections of Resistance, Inductance and Capacitance Circuits
6. Parallel Connections of Resistance, Inductance and Capacitance Circuits
7. Measurement of self-inductance, Mutual inductance and Coefficient coupling.
8. Verification of Mesh and Nodal Analysis
9. Demo on types of wires, cables and MCBS.
10. Wiring for celling rose and Two lamps with independent switch control circuits
11. Wiring for stair case
12. Demo on DC/AC Machines parts.

4. Booksand Materials

Text Book(s):

1.V. N. Mittal and Arvind Mittal, " *Basic Electrical Engineering*" McGraw Hill,2011.
2. Edward Hughes, "*Electricaland Electronics Technology*,"10th edition 2008,Pearson Education.
3. E.L.Donnelly "*Electrical Installation theory and practice*" third edition published by Thomas Nelson and Sons Ltd 1985.

Reference Book(s):

1. L. S. Bobrow, "*Fundamentals of Electrical Engineering*", Oxford University Press,2011.
2. D. C. Kulshreshtha, "*Basic Electrical Engineering*", McGraw Hill, 2009.

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

A30010 – MATHEMATICS – II

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

1. Course Description

Course Overview

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

Course Pre/co requisites

- Calculus
- Vectors

2. Course Outcomes (COs)

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

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

3. Course Syllabus

UNIT-I: Differential Equations of First and Higher Order

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

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

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

UNIT-III: Partial Differential Equations – First order

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

UNIT-IV: Vector differentiation

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

UNIT-V: Vector integration

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

4. Books and Materials

Textbooks:

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

References:

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

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

A30004-APPLIED PHYSICS

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

1. Course Description

Course Overview

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

Course Pre/co-requisites

Bridge Course

2. Course Outcomes (COs)

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

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

3. Course Syllabus

UNIT I

Physical Optics

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

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

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

UNIT II

Dielectric and Magnetic Materials

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

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

UNIT III

Electromagnetic Waves and Fiber Optics

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

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

UNIT IV

Semiconductors

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

UNIT V

Superconductors and Nano materials

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

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

4. Books and Materials

Text Book(s):

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

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

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

Reference Book(s):

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

2. M.N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy "A Text book of Engineering Physics"-

S.Chand Publications,11th Edition 2019.

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

A30503 – DATA STRUCTURES USING C

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

1. Course Description

Course Overview

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

Course Pre/Co-requisites

- C
- Mathematics

2. Course Outcomes (COs)

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

A30503.1 Learn to choose appropriate data structure as applied to specified problem definition.

A30503.2 Design and analyse linear and non-linear data structures.

A30503.3 Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.

A30503.4 Demonstrate advantages and disadvantages of specific algorithms and data Structures.

A30503.5 Develop programs for efficient data organisation with reduce time complexity.

A30503.6 Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

3. Course Syllabus

Unit-1
Introduction to Problem Solving Using C
Introduction: Structure of C Program, Identifiers, Basic data types, Variables, Constants, I/O functions , Operators, Selection Statements – if and switch statements, Repetition statements – while, for, do-while statements, other statements related to looping – *break, continue,goto*,Arrays-Operations
Unit-2
Solving Problems using arrays, Functions, Strings, Pointers.
Linear Data Structures
Stacks: Introduction-Definition-Representation of Stack-Operations on Stacks- Applications of Stacks.
Unit-3
Queues: Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues.

Unit-4
Linked lists:
Definition- Single linked list- Circular linked list- Double linked list- Circular Double linked list.
Sorting: Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merge Sort, Quick Sort

Unit-5
Search: Sequential Search, Binary Search, Hashing, time complexity.
Trees and Graphs:
Trees: examples, Binary Trees, Tree Traversals, Binary Search Trees.
Graph: BFS and DFS.

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

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

A30001 – COMMUNICATIVE ENGLISH

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

1. Course Description

Course Overview:

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

Course Pre/Co-requisites:

The course has no specific pre/co-requisites

Course Out comes (COs)

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

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

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

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

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

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

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

Course Syllabus

UNIT – I

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

If: Rudyard Kipling

UNIT –II

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

UNIT –III

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

UNIT –IV

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

UNIT – V

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

4. Books and Materials

Text Book:

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

Reference Books:

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

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

A30301-ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	4	14	0	56	3	30	70	100

1. Course Description

Course Overview

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

Course Pre/Co-requisites

The course has no specific prerequisite and co-requisites

2. Course Outcomes (COs)

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

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

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

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

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

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

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

3. Course Syllabus

PART -A

UNIT I

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

Curves used in Engineering Practice:

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

b) Rectangular Hyperbola – General method only.

c) Cycloid, Epicycloids and Hypocycloid

UNIT II

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

UNIT III

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

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

UNIT IV

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

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

UNIT V

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

PART –B (PRACTICE ONLY)

Introduction to Computer Aided Drafting:

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

4. Books and Materials

Text Book(s):

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

Reference Book(s)

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

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

A30008 – APPLIED PHYSICS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

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

Course Pre/co-requisites:

A30004- Applied Physics

2. Course Outcomes (COs)

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

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

3. Course Syllabus

(Any 12 of the following)

1. Determine the thickness of the paper using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Diffraction due to single slit
5. Dispersive power of a diffraction grating
6. Magnetic field along the axis of a circular coil carrying current
7. Determine the self-inductance of the coil (L) using Anderson's bridge
8. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)

9. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
10. To determine the resistivity of semiconductor by Four probe method
11. To determine the energy gap of a semiconductor
12. Measurement of resistance with varying temperature
13. Determination of dielectric constant by charging and discharging method.
14. LASER: Determination of wavelength of laser source by using diffraction grating
15. LASER: Determination of Particle size (hair) by using laser source

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Text Book(s):

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

Reference Book(s)

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

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

A30504 – DATA STRUCTURES LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

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

Course Pre/Co-requisites

A30503-Data Structures Using C

2. Course Outcomes (COs)

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

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

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

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

3. Course Syllabus

PART A: Introduction

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

Linked List, Stack, Queue

Task – 4	Write a program to implement stack, queue, circular queue using arrays and linked lists on employee details.
Task– 5	Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list
Task– 6	Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.

Task– 7	Write a program to remove duplicates from ordered and unordered arrays.
Task– 8	Write a program to implement quick sort using non-recursive and recursive approaches.
Task– 9	Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.
Task– 10	Write a program to implement depth first search and breadth first search on graphs.

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Text Book(s)

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

Reference Book(s)

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

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

A30006 – COMMUNICATIVE ENGLISH LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

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

Course Objectives:

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

Course Pre/co requisites

A30001-Communicative English

2. Course Outcomes (COs)

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

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

3. Course Syllabus

List of topics to be covered:

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

4. Books and Materials

Text Books:

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

Reference Books:

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

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

A30031-ENVIRONMENTAL SCIENCE

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

1. Course Description

Course Overview

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

Course Pre/co requisites

This course has no pre/co-requisites.

2. Course Outcomes (COs)

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

A30031.1- Solve environmental problems through higher level of personal involvement and interest.

A30031.2- Apply ecological morals to keep up amicable connection among nature and human beings.

A30031.3- Recognize the interconnectedness of human dependence on the earth's ecosystems.

A30031.4- Apply environmental laws for the protection of environment and wildlife.

A30031.5- Influence society in proper utilization of goods and services.

3. Course Syllabus

Unit -1: Introduction: Environment Definition, The multidisciplinary nature of environmental studies, Scope and importance-Need for public awareness.

Natural Resources: Classification of resources: Renewable and Non-renewable resources. Forest resources: Uses and over exploitation of forests. Dams and their effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water, conflicts over water. Food resources: Problems with Chemical fertilizers and pesticides. . Energy resources: Renewable energy resources: solar energy, wind energy and geothermal energy. Role of individual in conservation of natural resources

Unit – 2: Ecosystems: Ecosystem Definition. Structure of an ecosystem: Producers, Consumers and Decomposers. Function of ecosystems: Food chains, food webs and energy flow in an ecosystem. Ecological pyramids: Pyramid of number, Pyramid of biomass and Pyramid of energy. Introduction, types ,characteristic features ,structure and function of the following ecosystem. A) Forest ecosystem B) Dessert system C)Aquatic ecosystems(ponds,rivers,ocean,estuaries).

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

Unit -3: Environmental Pollution: Definition, causes, effects and control measures of Air Pollution, Water pollution, Soil pollution,Nuclear hazards, Global warming, Acid rains and Ozone layer depletion. Role of an individual in prevention of pollution. Solid waste management and Disaster management:floods,earthquakes,cyclone and landslides.

Unit -4: Social Issues and the Environment: Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion, crazy consumerism. Water conservation, Rainwater harvesting and environmental ethics. Environment Protection Act(Air, water, soil and wild life protection act)-Public awareness.

Unit -5: Human population and the Environment: population growth, variation, value education-HIV/AIDS-women and child welfare-Role of IT in environment and human health. Fieldwork-visit to a local area to document environmental assets.

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

4. Books and Materials

Text Books:

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

Reference Books:

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

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30015	Transform Techniques and Complex Variables	BS	3	0	0	3	40	60	100
A30205	Electrical Circuit Analysis	PC	3	0	0	3	40	60	100
A30206	Electrical Machines – I	PC	3	0	0	3	40	60	100
A30207	Electro Magnetic Fields	PC	3	0	0	3	40	60	100
A30410	Electronic Circuits-I	PC	2	0	2	3	40	60	100
A30208	Electrical Circuits and Simulation Laboratory	PC	0	0	3	1.5	40	60	100
A30209	Electrical Machines – I Laboratory	PC	0	0	3	1.5	40	60	100
A30411	Electronic Circuits-I Laboratory	PC	0	0	3	1.5	40	60	100
A30210	Fundamentals of PCB Design	SC	1	0	2	2	40	60	100
A30032	Universal Human Values	MC	3	0	0	3	100	0	100
	TOTAL		18	0	13	24.5	360	540	900

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

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30019	Managerial Economics & Financial Analysis	HS	3	0	0	3	40	60	100
A30020	Numerical Methods and Probability Theory	BS	3	0	0	3	40	60	100
A30212	Electrical Machines – II	PC	3	0	0	3	40	60	100
A30213	Control Systems	PC	3	0	0	3	40	60	100
A30419	Electronic Circuits-II	PC	3	0	0	3	40	60	100
A30214	Electrical Machines – II Laboratory	PC	0	0	2	1.5	40	60	100
A30215	Control Systems Laboratory	PC	0	0	3	1.5	40	60	100
A30420	Electronic Circuits-II Laboratory	PC	0	0	2	1.5	40	60	100
A30216	Programmable Logic Controllers	SC	1	0	2	2	40	60	100
TOTAL			15	00	11	21.5	360	540	900
Internship 2 Months (Mandatory) during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

COURSE STRUCTURE

III - SEMESTER

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30015	Transform Techniques and Complex Variables	BS	3	0	0	3	40	60	100
A30205	Electrical Circuit Analysis	PC	3	0	0	3	40	60	100
A30206	Electrical Machines – I	PC	3	0	0	3	40	60	100
A30207	Electro Magnetic Fields	PC	3	0	0	3	40	60	100
A30410	Electronic Circuits-I	PC	2	0	2	3	40	60	100
A30208	Electrical Circuits and Simulation Laboratory	PC	0	0	3	1.5	40	60	100
A30209	Electrical Machines – I Laboratory	PC	0	0	3	1.5	40	60	100
A30411	Electronic Circuits-I Laboratory	PC	0	0	3	1.5	40	60	100
A30210	Fundamentals of PCB Design	SC	1	0	2	2	40	60	100
A30032	Universal Human Values	MC	3	0	0	3	100	0	100
	TOTAL		18	0	13	24.5	360	540	900

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30015-TRANSFORM TECHNIQUES AND COMPLEX VARIABLES

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

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Theory of transforms (Laplace transforms, Fourier transforms and Z-transforms) and Fourier series, complex functions and differentiation, complex integration, power series expansion of complex function and single variable, residue theorem and evaluation of integrals by unit circle, semi-circle. The mathematical skills developed through this course form a necessary base to analyze and design problems encountered in their Engineering specialization.

Course Pre/corequisites

1. A30002 -Mathematics-I
2. A30010 -Mathematics-II

2. Course Outcomes (COs)

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

A30015.1 Apply Laplace transforms to solve ordinary differential equations

A30015.2 Build Fourier series and Fourier transforms of a given function.

A30015.3 Test for analyticity of complex functions in the given domain

A30015.4 Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours

A30015.5 Evaluate improper integrals of complex functions using Residue theorem.

3. Course Syllabus

UNIT-I

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

UNIT-III

Functions of Complex Variables: 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.

UNIT-IV

Complex Integration Power Series: 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

The Calculus of Residues: 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) $\int_{-\infty}^{\infty} f(x)dx.$

4. Books and Materials

Text Book(s)

1. B.S.Grewal, *Higher Engineering Mathematics*, 43rd edition, Khanna Publishers, New Delhi, 2014.
2. T.K.V.Iyengar,B.Krishna Gandhi, S.Ranganatham, M.V.S.S.N.Prasad,*Engineering Mathematics*, 2003.Vol-II, &Vol-IV,6th revised Edition, S.Chand& Company Pvt.Ltd, 2014.

Reference Book(s)

1. B.V.Ramana, *Higher Engineering Mathematics*, 23rd Reprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30205–ELECTRICAL CIRCUIT ANALYSIS

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

1. Course Description

Course Overview

The purpose of this course is to enable the student to acquire knowledge on D.C and A.C circuits. The objective of this course is to introduce theorems; two-port networks 3-phase circuits and transient and steady state responses. This course also gives the knowledge to solve the complex circuits in A.C and D.C circuits. In addition, this course also focuses on the concepts of resonance and locus diagrams.

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Course Pre/corequisites

1. A30201–Fundamentals of Electrical Engineering

2. Course Outcomes (COs)

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

A30205.1 Apply the theorems for complex circuits to calculate the voltage, current and power.

A30205.2 Apply the fundamental knowledge of circuits to evaluate the various network parameters of D.C and A.C circuits.

A30205.3 Analyze three phase circuits to determine line voltages, line currents, phase voltages and phase currents.

A30205.4 Apply differential equation and Laplace transform techniques for transient response of series and parallel RLC circuits.

A30205.5 Analyse the series and parallel resonance circuits and current locus diagrams.

3. Course Syllabus

UNIT-I

Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Millman's Theorems, Tellegen's, Superposition, Reciprocity and Compensation Theorems for D.C and Sinusoidal Excitations.

UNIT-II

Two Port Networks: Two Port Network Parameters: Impedance, Admittance, Transmission and Hybrid Parameters and their Relations. Concept of Transformed Network, Two Port Network Parameters Using Transformed Variables.

UNIT-III

Three Phase A.C Circuits : Phase Sequence- Star and Delta Connection-Relation between Line and Phase Voltages and Currents in Balanced Systems-Analysis of Balanced and unbalanced Three Phase Circuits- Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems. Loop Method- Application of Millman's Theorem- Star Delta Transformation Technique – for balanced and unbalanced circuits, Measurement of Active and reactive Power

UNIT-IV

Transient Response Analysis:

D.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation-Initial Conditions-Solution Method Using Differential Equations and Laplace Transforms, Response of R-L & R-C Networks to Pulse Excitation.

A.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for Sinusoidal Excitations-Initial Conditions-Solution Method Using Differential Equations and Laplace Transforms.

UNIT-V

Locus Diagrams & Resonance: Series R-L, R-C, R-L-C and Parallel Combination with variation of Parameters. Resonance: Series, Parallel Circuits, Concept of Bandwidth and Q Factor.

4. Books and Materials

Text Book(s)

1. John Bird, *Electrical Circuit Theory and Technology*, ELSEVIER, 4th edition, 2010.
2. M.E Van Valkenburg, *Network Analysis*,Pearson Education, 3rd edition, 2015.

Reference Book(s)

1. A. Chakrabarti, *Circuit Theory (Analysis & Synthesis),*Dhanpat Rai& Co.,6th edition, 2008.
2. N.Sreenivasulu,*Electric Circuits* by, REEM Publications Pvt. Ltd., 2012
3. William Hayt, Jack E. Kemmerly and Steven M. Durbin, *Engineering circuit analysis,*Mc Graw Hill Education (India) Pvt. Ltd., 6th edition, 2013.

COURSE STRUCTURE

A30206–ELECTRICAL MACHINES – I

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the importance of AC and DC electrical machines. This course deals with the principle, construction and operation of DC Generator, DC Motor, single phase and three phase transformers. The different testing techniques of dc machines and transformers are discussed. The DC machines and transformers studied in this course are applied in domestic and industrial systems.

Course Pre/corequisites

1. A30207-Electro Magnetic Fields

2. Course Outcomes (COs)

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

A30206.1 Apply the principles of AC and DC machines to identify a suitable electrical machine for a given application.

A30206.2 Deduce the emf and torque equations of DC Machines and single phase transformers.

A30206.3 Analyze the various characteristics of DC Machines, single phase and three phase transformers.

A30206.4 Test the performance of DC Machines and Single phase transformers.

A30206.5 Apply suitable starters and suitable test to control the speed of DC motor.

3. Course Syllabus

UNIT-I

D.C. Generators – Principle of Operation – Constructional Features –Windings– E.M.F Equation– Armature Reaction-Commutation, Types of generators– Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators.- Applications

UNIT-II

D.C. Motors – Principle of Operation – Back E.M.F.–Torque Equation – Characteristics of Shunt, Series and Compound Motors- Applications.

Testing of D.C.Machines and Speed Control of DC Motors: Speed Control of D.C. Shunt motors-3 and 4 point Starters- Losses and Efficiency.

Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test – Hopkinson's Test – Field's Test.

UNIT-III

Single Phase Transformers: Principle, Construction and operation -Types of transformers-Emf Equation - Operation on No Load and on Load - Phasor Diagrams. Equivalent Circuit - Losses and Efficiency-Regulation. All Day Efficiency.

UNIT-IV

Testing of Transformers: OC and SC Tests - Sumpner's Test-Parallel Operation of transformers with Equal and Unequal Voltage Ratios - Auto Transformers-Applications.

UNIT-V

Three Phase Transformers: Three phase transformer connections - Y/Y,Y/Δ, Δ/Y,Δ/Δ, open-Δ, Three-winding transformers-tertiary windings, Scott connection.

4. Books and Materials

Text Book(s)

1. P.S. Bimbhra, *Electrical Machines*, Hanna Publishers, 7th edition, 2011.
2. J.B.Gupta, Kataria, *Theory and performance of Electrical Machines*, S. K. & Sons Publications-2013.

Reference Book(s)

1. B.L. Theraja and A.K.Theraja, *Electrical Technology*, S.Chand Publications, Volume-II, 2006.
2. D.P.Kothari and I.J. Nagrath, *Electric Machines,* McGraw Hill Education (India) Pvt. Ltd., 4th Edition, 2010, 16th Reprint 2015.
3. Ashfaq Hussain, *Electrical Machines*, Dhanpat Rai& Co, 2nd Edition, 2005.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30207– ELECTROMAGNETIC FIELDS

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about electric and magnetic fields. This course deals with the fundamentals of electrostatics, magneto statics and time varying fields. Here the behaviour of static fields, magnetic fields, and properties of dielectrics, magnetic materials, time-varying Fields and wave propagation are discussed. This course also emphasizes the practical applications of electromagnetic in Power Systems and Electrical Machines.

Course Pre/corequisites

1. A30002-Mathematics-I
2. A30004-Appled Physics
3. A30010-Mathematics-II
4. A30201-Fundamentals of Electrical Engineering

2. Course Outcomes (COs)

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

A30207.1 Apply orthogonal coordinate systems for Electric and magnetic fields over the distribution of charge.

A30207.2 Analyse the charge configurations of Electric and Magnetic fields using Coulombs law, Gauss's law, Biot-Savart's law, Ampere's circuital law and Poynting theorem.

A30207.3 Evaluate the capacitance, Inductance and Magnetic forces for various conductors in Electromagnetic fields.

A30207.4 Investigate the behaviour of Electric and Magnetic Fields in Static and Time Varying Fields by Maxwell's equations.

A30207.5 Analyse the plane wave equation in free space, dielectrics and conductors.

3. Course Syllabus

UNIT-I

Introduction to Coordinate Systems and Electro Static Fields: Types of Coordinate systems, Del operator, Dot and Cross products, divergence and Stokes Theorems. Coulomb's Law-Electric Field Intensity (EFI) and its applications - Work done - Electric Potential due to point, line and volume charges - Potential gradient.

Gauss's law and its applications-Laplace's and Poison's equations- Electric dipole- Dipole moment- Potential and EFI due to an electric dipole.

UNIT-II

Conductors, Dielectrics and Capacitance: Behavior of conductors in an electric field- Polarization- Conductor and free space, Conductor and Dielectric, Dielectric and Dielectric boundary conditions. Capacitance of parallel plate, spherical, co-axial cable and composite parallel plate capacitors – Energy stored and energy density in a static electric field – Conduction and Convention current densities – Ohm's law in point form – Equation of continuity.

UNIT-III

Static Magnetic Fields and Force in Magnetic Fields: Biot-Savart's law, MFI due to a long straight finite, infinite and Circular Loop current carrying conductors- Maxwell's second Equation, div(B)=0. Ampere's circuital law and its applications– Point form of Ampere's circuital law.

Magnetic force - Lorentz force equation – Force on a long straight and two long straight parallel current carrying conductors – Magnetic dipole and dipole moment– Torque on a current loop placed in a magnetic field.

UNIT-IV

Magnetic Potential and Inductance: Scalar Magnetic Potential and Laplace's Equation for Scalar Magnetic Potential, Vector Magnetic Potential and Poisson's Equation for magnetic field.

Self and Mutual inductance – Neumann's formula – determination of self inductance of a solenoid and a toroid -Mutual inductance between a straight, long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

UNIT-V

Maxwell's Equations and Electromagnetic Wave Propagation: Faraday's laws of electromagnetic induction and its integral and point forms. Statically and dynamically induced E.M.F's – Modified Maxwell's equations for time varying fields – Displacement current.

Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane waves in free space, and plane waves in good conductors, Poynting vector and Poynting Theorem.

4. Books and Materials

Text Book(s)

1. Matthew N.O.Sadiku ,S.V.Kulkarni, *Electro Magnetic Fields*, 4th edition,Oxford Publications India,2005. New Delhi.
2. S.Sivanagaraju, C.SrinivasaRao, *Electromagnetic Fields,* New Age publishers, 2008.

Reference Book(s)

1. WilliamH.Hayt, John.A.Buck,Engineering Electromagnetics,7thedition,Tata McGraw Hill Companies, 2006, New Delhi.
2. John. D. Kraus, D.A. Fleish, Electromagnetics with Applications, 5thedition,TataMcGraw-Hill, 1997 New Delhi, India.
3. K.A. Gangadhar, Electromagnetic Field Theory, Khanna Publications, 2003.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30410 – ELECTRONIC CIRCUITS-I

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

1. Course Description

Course Overview

This course 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 analysing principle of operation of p-n junction diode, special diodes, rectifiers, BJT and FET. This course provides comprehensive understanding of number systems, Boolean algebra, logic gates, minimization techniques, combinational and sequential logic.

Course Pre/corequisites

1. A30004–Applied Physics

2. Course Outcomes (COs)

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

A30410.1 Analyze the operation and characteristics of diodes and transistors.

A30410.2 Analyze various applications of diodes and transistors.

A30410.3 Make use of Boolean algebra postulates to minimize Boolean functions.

A30410.4 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.

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: 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30208 –ELECTRICAL CIRCUITS AND SIMULATION LABORATORY

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about simulation programming of electrical circuits. This course deals with simulation programming of DC circuits, transient & frequency response of DC / AC circuits, network theorems, filters and measurement of power using the PSPICE software.

Course Pre/corequisites

1. A30201– Fundamentals of Electrical Engineering
2. A30202 – Fundamentals of Electrical Engineering Laboratory

2. Course Outcomes (COs)

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

A30208.1 Analyze RL and RC series circuits, 3 phase balanced and unbalanced system and power system network using PSPICE programming.

A30208.2 Test the transient response of DC & AC series RLC circuits using PSPICE programming.

A30208.3 Design the dual network, low pass and high pass filter using PSPICE programming.

A30208.4 Simulate a given DC circuit using PSPICE programming.

3. Course Syllabus

1. Simulation of DC Circuits using PSPICE
2. Duality of networks using PSPICE
3. Transient response of AC networks for RL and RC circuits using PSPICE
4. DC Transient Response using PSPICE
5. Frequency Response of RLC Series Circuits using PSPICE
6. Analysis of RL and RC Series Circuits for AC & DC Excitation
7. Analysis of Three Phase Balanced systems using PSPICE
8. Analysis of Three Phase Unbalanced systems using PSPICE
9. Analysis of Power System Network (Consists of Generator Transmission Line and Load)using PSPICE
10. Simulation of Super Position Theorem using PSPICE
11. Design Low Pass and High Pass Filters

4. Laboratory Equipment/Software/Tools Required

1. PSPICE Software

5. Books and Materials

Text Book(s)

1. Dr. A.S. Aravinda Murthy, *Fundamentals of Electrical circuits with PSPICE*, Sanguine Technical publishers, Bengaluru, 2009.
2. K.M.Soni,*Circuits and Systems*, S.K. Kataria&Sons publishers of Engineering and Computer Books, New Delhi, July 2008

Reference Book(s)

1. A.Chakrabarti,*Circuit Theory (Analysis and synthesis)*, DhanpatRai& Co ltd, Newdelhi, 2013

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30209– ELECTRICAL MACHINES-I LABORATORY

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about different types of DC Machines. This course deals with the testing and performance of different DC Machines. Here the DC machines with different speed control techniques are tested. These machines are applied in different domestic and industrial sectors.

Course Pre/corequisites

1. A30201 - Fundamentals of Electrical Engineering
2. A30203 - Electrical Machines-I

2. Course Outcomes (COs)

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

A30209.1 Determine the critical field resistance and critical speed of a DC Shunt generator.

A30209.2 Plot the characteristics of DC shunt, Series and Compound generators using load test.

A30209.3 Test the performance of a given DC motor using suitable technique.

A30209.4 Apply suitable test to calculate the losses for a given DC machine.

3. Course Syllabus

1. Magnetization characteristic of DC shunt generator &-Determination of critical field resistance and critical speed.
2. Brake test on DC shunt motor- Determination of performance curves.
3. Load test on DC shunt generator -Determination of characteristics.
4. Load test on DC series generator-Determination of characteristics.
5. Load test on DC compound generator-Determination of characteristics.
6. Brake test on DC Compound motor.-Determination of performance curves.
7. Swinburne's test and speed control of DC shunt motor- Predetermination of efficiencies.
8. Fields test on DC series machines-Determination of efficiency.
9. Hopkinson's Test on DC shunt machines-Predetermination of efficiency.
10. Separation of losses in DC shunts motor.
11. Retardation Test.
12. Brake test on DC series motor. Determination of performance curves.

4. Laboratory Equipment/Software/Tools Required

1. DC shunt generator
2. DC shunts motor
3. DC series generator
4. DC compound generator
5. DC compound motor

5. Books and Materials

Text Book(s) :

1. P.S. Bimbhra "*Electrical Machinery*: Khanna Publishers, 7th Edition, 2011.

Reference Book(s)

1. B.L. Theraja and A.K.Theraja, "*Electrical Technology*: S.Chand Publications, Volume II,2006.
2. Ashfaq Hussain*"Electrical Machines"*Dhanpat Rai& Co, 2nd Edition, 2005.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30411 – ELECTRONIC CIRCUITS - I LABORATORY

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

1. Course Description

Course Overview

This laboratory course provides the students an electrical model for various semiconductor devices. In this course students can find and plot V_I characteristics of all semiconductor devices and learn the practical applications of the devices. This laboratory course introduces LabVIEW graphical programming. This course deals with graphical programming of logic gates, universal logic gates, multiplexers, adders and flip-flops using NI LabVIEW software.

Course Pre/corequisites

1. A30004 – Applied Physics
2. A30008 – Applied Physics Laboratory
3. A30403 – Electronic Devices and Circuits
4. A30404 – Digital Logic Design

2. Course Outcomes (COs)

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

A30411.1 Analyze the description of CRO and Function generator panels.

A30411.2 Determine cut-in, break-down voltages, static and dynamic resistances from V-I characteristics of electronic devices.

A30411.3 Measure the ripple content present in rectifiers using with and without filters.

A30411.4 Make use of small signal analysis to plot the characteristics of BJT and FET.

A30411.5 Make use of LabVIEW software to construct combinational and sequential circuits.

A30411.6 Test and Debug the combinational and sequential circuits using LabVIEW Software.

3. Course Syllabus

1. **Electronic Workshop Practice:** Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.
4. P-N Junction Diode Characteristics
5. Zener Diode Characteristics
6. Half-wave and Full-wave Rectifiers
7. BJT Characteristics (CE Configuration)
8. Introduction to NI Lab VIEW
9. Realization of logic gates.
10. Realization of Boolean function using basic gates and using Universal gates.
11. Implementation and verification of multiplexers.

12. Implementation and verification of half adder, full adder.
13. Design and verification of 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30210 – FUNDAMENTALS OF PCB DESIGN

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

1. Course Description

Course Overview:

This is a basic course for designing of PCB using software. PCB (Printed Circuit Board) designing is an integral part of each electronics products and this program is designed to make students capable to design their own projects PCB up to industrial grade.

Course Pre/Co-requisites:

The course has no specific pre/co-requisites

2. Course Outcomes (COs)

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

A30210.1 Understand the significance of printed circuit board design
A30210.2 Analyze various PCB components and their categories
A30210.3 Understand the concept of development tools like OrCAD and PROTEUS
A30210.4 Develop academic and industrial based projects using OrCAD and PROTEUS.

3. Course Syllabus

UNIT - I

Introduction to PCB designing concepts: Introduction & Brief History - what is PCB, Difference between PWB and PCB, Types of PCBs: Single Sided (Single Layer), Multi-Layer (Double Layer), PCB materials.

Introduction to Electronic design Automation (EDA): Brief History of EDA, Latest Trends in Market, How it helps and why it requires, Different EDA tools, Introduction to SPICE and PSPICE Environment, Introduction and Working of PROTEUS.

UNIT - II

Component introduction and their categories: Types of Components - Active Components – Diode, Transistor, MOSFET, LED, SCR, Integrated Circuits (ICs). Passive Components – Resistor, Capacitor, Inductor, Transformer, Speaker/Buzzer.

Component Package Types: Through Hole Packages - Axial lead, Radial Lead, Single Inline Package (SIP), Dual Inline Package(DIP), Transistor Outline(TO), Pin Grid Array(PGA). Through Hole Packages - Metal Electrode Face (MELF), Leadless Chip Carrier (LCC), Small Outline Integrated Circuit (SOIC), Quad Flat Pack (QPF) and Thin QFP (TQFP), Ball Grid Array (BGA), Plastic Leaded Chip Carrier (PLCC).

UNIT - III

Introduction to Development Tools: Introduction to PCB Design using OrCAD tool, Introduction to PCB Design using PROTEUS tool.

UNIT - IV

Detailed description and practical of PCB designing: PCB Designing Flow Chart: Schematic Entry, Net listing, PCB Layout Designing, Prototype Designing - Design Rule Check (DRC), Design For

Manufacturing (DFM), PCB Making – Printing, Etching, Drilling. Assembly of components. **Description of PCB Layers:** Electrical Layers - Top Layer, Mid Layer, Bottom Layer. Mechanical Layers - Board Outlines and Cutouts, Drill Details.Documentation Layers - Components Outlines, Reference Designation, Text.

Keywords & Their Description: Footprint, Pad stacks, Vias, Tracks, Color of Layers, PCB Track Size Calculation Formula.

PCB Materials: Standard FR-4 Epoxy Glass, Multifunctional FR-4, Tetra Functional FR-4, NelcoN400-6, GETEK, BT Epoxy Glass, Cyanate Aster, Plyimide Glass, Teflon.

Rules for Track: Track Length, Track Angle, Rack Joints, Track Size.

Study of IPC Standards: IPC Standard For Schematic Design, IPC Standard For PCB Designing, IPC Standard For PCB Materials, IPC Standard For Documentation and PCB Fabrication.

UNIT - V

Lab practice and designing concepts: Starting the PCB designing - Understanding the schematic Entry, Creating Library & Components, Drawing a Schematic, Flat Design / hierarchical Design, Setting up Environment for PCB, Design a Board.

Auto routing: Introduction to Auto routing, Setting up Rules, Defining Constraints, Auto router Setup.

PCB Designing Practice: PCB Designing of Basic and Analog Electronic Circuits, PCB Designing of Power Supplies, PCB Designing of Different Sensor modules, PCB Designing of Electronics Projects, PCB Designing of Embedded Projects.

Project work: Making the schematic of Academic and Industrial projects, PCB Designing of these projects, Soldering and De-soldering of components as per Design, Testing and Troubleshooting Methods.

4. Books and Materials

Text Book:

1. Michael Dsouza and Dsouza Michael,*PCB Design: Printed Circuit Board*, Kindle edition.
2. KraigMitzner, *Complete PCB Design Using OrCAD Capture and PCB Editor,* 1st edition, kindle.

Reference Books:

1. Simon Monk, Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards (Electronics).
2. James Drewniak and Bruce R Archambeault, PCB Design for Real-World EMI Control.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30032 – UNIVERSAL HUMAN VALUES

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

1. Course Description

Course Overview:

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

Course Pre/Co-requisites:

The course has no specific pre/co-requisites

2. Course Outcomes (COs)

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

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

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

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

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

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

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

3.Course Syllabus

UNIT – I

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

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance 'and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority

5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT –II

Understanding Harmony in the Human Being - Harmony in Myself

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

UNIT –III

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

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

UNIT –IV

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

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

UNIT – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

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

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

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

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

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

4. Books and Materials

Text Book:

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

Reference Books:

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

COURSE STRUCTURE

IV - SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMMECURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30019	Managerial Economics & Financial Analysis	HS	3	0	0	3	40	60	100
A30020	Numerical Methods and Probability Theory	BS	3	0	0	3	40	60	100
A30212	Electrical Machines – II	PC	3	0	0	3	40	60	100
A30213	Control Systems	PC	3	0	0	3	40	60	100
A30419	Electronic Circuits-II	PC	3	0	0	3	40	60	100
A30214	Electrical Machines – II Laboratory	PC	0	0	2	1.5	40	60	100
A30215	Control Systems Laboratory	PC	0	0	3	1.5	40	60	100
A30420	Electronic Circuits-II Laboratory	PC	0	0	2	1.5	40	60	100
A30216	Programmable Logic Controllers	SC	1	0	2	2	40	60	100
TOTAL			15	00	11	21.5	360	540	900
Internship 2 Months (Mandatory) during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30020 – NUMERICAL METHODS AND PROBABILITY THEORY

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

1. Course Description

Course Overview

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations, the theory of Probability and random variables.

Course Pre/Co-requisites

Basic Equations and Basic Probability

2. Course Outcomes (COs)

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

A30020.1 Apply Numerical methods to solve algebraic and Transcendental equations using different methods and different conditions

A30020.2 Apply various interpolation methods and finite difference concepts

A30020.3 Perform numerical differentiation and numerical integration

A30020.4 Apply Probability theory to find the chances of happening of events

A30020.5 Apply Probability distribution to real time problems

3. Course Syllabus

UNIT-I

Solution of Algebraic & Transcendental Equations: Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

UNIT-II

Interpolation: Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae.Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT-III

Numerical Integration & Solution of Initial ValueProblems to Ordinary Differential Equations: Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule, Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

UNIT-IV

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

UNIT-V

Random Variables & Distributions: Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties-Uniform distribution-exponential distribution

4. Books and Materials

Text Books:

1. B.S.Grewal, *Higher Engineering Mathematics*, 43rd edition, Khanna Publishers, New Delhi, 2014.
2. Ronald E. Walpole,*Probability and Statistics for Engineers and Scientists*,PNIE.
3. Erwin Kreyszig , *Advanced Engineering Mathematics*, by, Wiley India.

Reference Books:

1. B.V.Ramana, *Higher Engineering Mathematics*, 23rd Reprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.
2. Alan Jeffrey , *Advanced Engineering Mathematics*, Elsevier.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30019 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

There are no prerequisites and corequisites for this course.

2. Course Outcomes (COs)

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

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

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

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

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

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

3. Course Syllabus

UNIT I

Managerial Economics: Definition, nature and scope of managerial economics, relation with other disciplines –demand analysis: types, determinants, laws, GST-implications.

Elasticity of Demand: Types, measurement and significance, methods of demand forecasting.

UNIT II

Production function: Isoquants and 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, pearson education, New Delhi, 2011.

COURSE STRUCTURE

A30212 – ELECTRICAL MACHINES – II

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

1. Course Description

Course Overview

This course is helpful in designing of traction systems. The purpose of this course is to familiarize the students about the importance of AC electrical machines. This course deals with the principle, construction and operation of Three phase induction motors, Alternators and Synchronous motors. Here the performance characteristics of various AC machines are discussed. The concepts of AC machines discussed in this course are applied in domestic and industrial systems.

Course Pre/co requisites

1. A30204-ElectroMagnetic Fields
2. A30203-Electrical Machines-I
3. A30201-Fundamentals of Electrical Engineering

2. Course Outcomes (COs)

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

A30212.1 Apply the principles of AC machines to identify a suitable electrical machine for a given application.

A30212.2 Deduce the power and torque equations of Induction motors and synchronous machines.

A30212.3 Analyze the various characteristics of induction motors and synchronous machines.

A30212.4 Test the performance of induction motors and synchronous machines.

A30212.5 Apply a suitable test to control speed of Induction motors.

3. Course Syllabus

UNIT-I

Three-Phase Induction Motors: Constructional Details-Production of Rotating Magnetic Field - Principle of Operation –Slip - Rotor Parameters at Standstill and under running conditions –Power flow diagram.

UNIT-II

Performance of Induction Motors: Characteristics, starting and speed control of three phase induction motors: Torque Equation – Torque-Slip Characteristic – Crawling and Cogging- -Circle

Diagram-No Load and Blocked Rotor Tests-Predetermination of Performance, Starting methods and speed control of induction motor- Applications.

UNIT-III

Three phase Alternators: Principle, Construction and operation,types, Windings and Factors, E.M.F Equation, Armature Reaction, Synchronous Reactance and Impedance, Load Characteristics, Phasor Diagram.

UNIT-IV

Regulation of Alternator: Voltage Regulation Methods, Two Reaction Theory –Determination of Xd and Xq (Slip Test) -Power Flow Equation in Alternators – Synchronizing Power and Torque.Parallel Operation and Load Sharing – Effect of Change of Excitation and Mechanical Power Input – Synchronizing Alternators with Infinite Bus Bars.

UNIT-V

Synchronous Motors: Theory of Operation – Phasor diagram – Power Flow Equations in Synchronous Motors- Variation of Current and Power Factor with Excitation – V and Inverted V Curves – Synchronous Condensers – Hunting, and Methods to Eliminate Hunting – Starting Methods of Synchronous Motor.

4. Books and Materials

Text Book(s)

1. P.S. Bimbhra"*Electrical Machinery*: Khanna Publishers, 7th edition, 2011.
2. J.B.Gupta,Kataria "*Theory and performance of Electrical Machines*" S.K.Sons Publications,2013.

Reference Book(s):

1. U.A. Bakshi and M.V.Bakshi, "*Electrical Machines-III*", Technical Publications, 2nd edition, 010.
2. D.P.Kothari and I.J. Nagrath"*Electric Machines*" McGraw Hill Education (India) Pvt. Ltd., 4th edition, 2010, 16th Reprint 2015.
3. Ashfaq Hussain"*Electrical Machines*"Dhanpat Rai& Co, 2nd edition, 2005.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30213 – CONTROL SYSTEMS

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different control systems applied to electrical systems. This course deals with the types of control systems, mathematical modeling of physical systems, time response analysis, frequency response analysis and its stability techniques. It also covers the state space analysis of linear systems. The main applications of control systems are in automation industry, Robotics, Space Technology and Ship stabilization systems.

Course Pre/corequisites

1. A30002- Mathematics-I

2. Course Outcomes (COs)

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

A30213.1	Determine the transfer function of a given system using different techniques.
A30213.2	Analyze the response of a given system in time and frequency domains.
A30213.3	Test the stability, observability and controllability of a given system.
A30213.4	Apply suitable technique for calculating the gain margin and phase margin of a given system.

3. Course Syllabus

UNIT – I

Introduction: Open loop and closed loop systems and their differences, different examples of control systems, effect of feedback on gain, sensitivity and stability.

Mathematical Modelling of Physical Systems: Transfer function of translational and rotational mechanical systems, Force (Torque)-Voltage and Force (Torque)-Current analogies, block diagram reduction techniques, signal flow graphs and Mason's gain formula, transfer function of armature controlled, field controlled D.C servo motors, transfer function of A.C. Servo motor.

UNIT – II

Time Response Analysis: Standard test signals, unit impulse and step response of first order systems,unit step response of second order system, time response specifications, steady state errors and error constants, dynamic error coefficients, effects of proportional, derivative, proportional derivative, proportional integral and PID controllers.

UNIT – III

Stability Analysis: Introduction to stability, necessary and sufficient conditions for stability, Routh's stability criterions and its limitations, relative stability.

The Root Locus Concept: Root locus concept, rules to construct root locus, graphical determination of 'k' for specified damping ratio, relative stability, effect of adding zeros and poles to transfer function on root locus.

UNIT – IV

Frequency Domain Analysis: Introduction, frequency domain specifications, correlation between time and frequency responses, stability analysis from Bode plot and Nyquist plot, calculation of gain margin and phase margin, determination of transfer function from Bode diagram.

Compensators: Lag, lead, lead - lag networks.

UNIT – V

State Space Analysis: Concept of state, state variables and state model, physical, phase and canonical variable representation of state models, derivation of transfer function from state models, diagonalization, solving the time invariant state equations, state transition matrix and its properties, concepts of controllability and observability.

4. Books and Materials

Text Book(s)

1. I J Nagrath and M Gopal, *Control System Engineering,* New Age International Publication,5th edition, 2007.
2. Katsuhiko Ogata. *Modern Control Engineering*, Prentice Hall of India, 5th edition, 2010.

Reference Book(s)

1. A. Nagoor Kani. *Control Systems Engineering*, RBA publications, 2nd edition, 2009.
2. B. C. Kuo and Farid Golnaraghi. *Automatic Control Systems*, John Wiley, 8th edition, 2003.

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COURSE STRUCTURE

A30419 – ELECTRONIC CIRCUITS-II

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

1. Course Description

Course Overview

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 and their use in communication applications. With modern digitization advantages we need to work with digital data and hence digital ICs play a crucial role in connecting physical world to the more sophisticated digital world. It deals with classification of signals and systems in continuous and discrete time domains. The Fourier, Laplace transform representation of signals and systems are also covered in detail.

Course Pre/co requisites

1. A30002 Mathematics-I
2. A30410 Electronic Circuits- I

2. Course Outcomes (COs)

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

A30419.1 Analyze the characteristics and applications of operational amplifier.

A30419.2 Construct different active filters and oscillator circuits using op-amp and make use of IC 555 and PLL effectively in communication systems.

A30419.3 Analyze the concepts of combinational and sequential logic circuits and use them in the design of latches, counters using digital IC's.

A30419.4 Distinguish between different signals and systems.

A30419.5 Analyze different signals by using an appropriate transform

.

3. Course Syllabus

UNIT-I

Basics of Op-amp: Characteristics of ideal and practical op-amps, block diagram of Op-Amp, op-amp characteristics - DC and AC characteristics, pin configuration of IC-741 Op-amp and its features, open-loop and closed loop configurations

Op-amp Applications-I: AC amplifier, instrumentation amplifier using transducer bridge, differentiator and integrator.

UNIT-II

Op-amp Applications-II: Introduction, 1st order LPF, HPF filters, band pass, band reject and all pass filters. Oscillator types and principle of operation- RC, wien, and quadrature type.

Timers and PLL: Introduction to IC 555 timer, functional diagram, monostable, astable operations, Introduction, Schematic diagram, principles and description of individual blocks of analog IC565.

UNIT-III

Binary Systems and Gate Level Minimization: Digital Systems, number base conversions, octal and hexadecimal numbers, the map method, four variable map, logic gates.

Combinational & Sequential Circuits: Code converters, decoders, encoder, priority encoder, multiplexers, demultiplexers, 2-bit comparator circuit. Latches, flip-flops&their conversions.

UNIT-IV

Classification of Signals: Continuous time and discrete time, analog and digital, periodic and a periodic, energy and power, even and odd, causal and non-causal, deterministic and random, unit Impulse, Step, ramp and parabolic signals, time shifting, time scaling, time reversal and combined operations on signals.

UNIT-V

Classification of Systems: Continuous time and discrete time, analog and digital, instantaneous and dynamic, causal and non-causal, linear and non-linear, time-invariant and time varying, stable and unstable, invertible and non-invertible.

4. Books and Materials

Text Book(s)

1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 2nd edition, 2003. Education, 2007
2. M.Morris Mano &Micheal D. Ciletti *Digital Design*, Pearson, 5thedition, 2013.
3. A.V. Oppenheim, A.S. Willsky and S.H. Nawab. *Signals and Systems*, Pearson Education, 2ndedition, 1997.

Reference Book(s)

1. Ramakanth A. Gayakwad, *Op-Amps and Linear ICs*, PHI, 4th edition, 1987.
2. R.D. Sudhakar Samuel, *Digital Logic Design*, Elsevier.
3. A.Anand Kumar,*Signals and Systems*, Prentice Hall of India, 2012.

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COURSE STRUCTURE

A30214–ELECTRICAL MACHINES-II LABORATORY

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about different types of AC Machines. This course deals with the testing and performance of different AC Machines. Also the performance and calculating the parameters of a single phase transformer is carried out. These machines are applied in different domestic and industrial sectors.

Course Pre/co requisites

1. A30201-Fundamentals of Electrical Engineering
2. A30203 - Electrical Machines-I
3. A30209 - Electrical Machines-II

2. Course Outcomes (COs)

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

A30214.1 Test the performance of 1 phase Transformer, 3 phase induction motor and synchronous motor by conducting suitable test.

A30214.2 Determine circuit parameters of a 1 phase Transformer, 3 phase induction motor and synchronous motor by conducting suitable test.

A30214.3 Apply Scott connection for the conversion of a 3 phase to 2 phase systems.

A30214.4 Determine the regulation of a 3 phase alternator and 1 phase transformer by conducting suitable test.

A30214.5 Test the parallel operation and polarity test of a single phase transformer.

3. Course Syllabus

1. O.C & S.C Tests on Single phase Transformer.
2. Sumpner's Test on a pair of identical single phase Transformers.
3. Scott Connection of Transformers.
4. No-Load & Blocked Rotor Tests on Three Phase Induction Motor.
5. Regulation of Three phase Alternator by Synchronous Impedance & M.M.F Method.
6. Determination of X_d and X_q of a salient Pole Synchronous Machine.
7. V and Inverted V Curves of Three Phase Synchronous Motor.
8. Separation of Core Losses of a Single Phase Transformer.
9. Brake Test on Three Phase Induction Motor.
10. Parallel operation of single phase Transformers.
11. Regulation of Three phases Alternator by Z.P.F & A.S.A Methods.
12. Polarity Test on Single Phase Transformer.

4. Laboratory Equipment/Software/Tools Required

1. Single phase Transformer
2. Three phase Transformer
3. Single Phase Induction Motor
4. Three Phase Induction Motor
5. Three phase Alternator
6. Three Phase Synchronous Motor

5. Books and Materials

Text Book(s) :

1. P.S.Bimbhra "*Electrical Machinery*: Khanna Publishers, 7th Edition, 2011.

Reference Book(s):

1. B.L.Theraja and A.K.Theraja, "*Electrical Technology*: ,S.Chand Publications,Volume II,2006.
2. AshfaqHussain "*Electrical Machines*" DhanpatRai& Co, 2nd Edition, 2005.

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COURSE STRUCTURE

A30215 - CONTROL SYSTEMS LABORATORY

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about different control techniques applied to electrical systems. This course deals with characteristics of AC servo motor, DC servo motors, synchros and magnetic amplifier. This course also deals with Time response of second order system, Programmable Logic Controller, Transfer Function of DC Machine, Effect of P,PD, PI, PID Controller on a Second Order System and Lag and Lead compensators. It also discusses the MATLAB software to simulate and analyze the systems.

Course Pre/corequisites

1. A30210 - Control Systems

2. Course Outcomes (COs)

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

A30215.1 Plot the characteristics of AC servo motor, DC servo motor, synchros and magnetic amplifier.

A30215.2 Determine the transfer function of DC machine and time domain specifications of second order system.

A30215.3 Analyze the different logic gates using Programmable Logic Controller

A30215.4 Analyze the stability of given system in time domain and frequency domain using MATLAB software.

A30215.5 Test the effect of P, PD, PI, PID controller on a second order system.

3. Course Syllabus

1. Time Response of Second order system
2. Characteristics of Synchros
3. Programmable Logic Controller
4. Effect of Feedback on DC Servomotor
5. Transfer Function of DC Generator
6. Effect of P,PD, PI, PID Controller on a Second order system
7. Temperature Controller Using PID
8. Characteristics of Magnetic Amplifiers

9. Characteristics of AC Servomotor
10. Linear System Analysis (Time Domain Analysis, Error Analysis) using MATLAB
11. Stability Analysis (Bode, Root Locus, Nyquist Plot)of Linear Time Invariant System using MATLAB

Additional experiments:

12. State Space Model for Classical Transfer Function Using MATLAB-Verification.
13. Latching Control Circuit using PLC Kit
14. Block in Parallel Connection using PLC Kit
15. Normally Closed Contact in Series Connection using PLC Kit
16. Entry/Exit Control of the Underground Car Park using PLC Kit
17. Daily Production Record (16-bit Counting Up Latched Counter) using PLC Kit

4. Laboratory Equipment/Software/Tools Required

1. Synchros Kit
2. AC servo motor
3. DC servo motor
4. Programmable Logic Controller Kits
5. Temperature Controller Using PID
6. P,PD, PI, PID Controller Kit
7. Magnetic Amplifier
8. Linear Control System Kit

5. Books and Materials

Text Book(s)

1.I J Nagrath and M Gopal,*Control System Engineering,* New Age International Publication,5th edition, 2007.

2. John W Webb &Ronald A Reis,*Programmable Logic Controllers-Principles and applications*, PHI Learning Private Limited,Eastern Economy Edition,2009.

Reference Book(s)

1. A.NagoorKani, Control *Systems Engineering*, RBA publications, 2nd edition,2009.

2. B.C.Kuo and FaridGolnaraghi,*Automatic Control Systems*, John Wiley, 8th edition,2003.

3.KatsuhikoOgata,*Modern Control Engineering*, Prentice Hall of India, 5th edition,2010.

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COURSE STRUCTURE

A30420 – ELECTRONIC CIRCUITS-II LABORATORY

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

1. Course Description

Course Overview

This laboratory course 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 the concepts of specialized ICs like 555 timer and 565 PLL. It deals with classification of signals and systems in continuous and discrete time domains.

Course Pre/co requisites

1. A30002 Mathematics-I
2. A30419 Electronic Circuits-II

2. Course Outcomes (COs)

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

A30420.1	Implement different configurations of operational amplifiers.
A30420.2	Construct and analyze various active filters using op-amp.
A30420.3	Design and draw the internal structure of various logic gates.
A30420.4	Analyze the generation of operations of various signals and sequences using MATLAB.

3. Course Syllabus

1. Construct and test the performance of
a) Unity gain amplifier
b) Non – Inverting amplifier
c) Inverting amplifier
2. Design of Astable multi vibrator as a square wave generator.
3. Design and analyze the practical differentiator.
4. Design and analyze the practical integrator.
5. Design and analyze the 1st order low pass and high pass filters and plot the frequency responses.
7. Realization of logic gates.
8. 3X8 Decoder – 74138.
9. 8X1 Multiplexer – 74151.
10. D – Flip-flop – 7474.

11. Generation of Various signals and Sequences Such as Unit Impulse, Unit Step, Square, Saw Tooth, Triangular, Sinusoidal, Ramp, Sinc.
12. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.

4. Laboratory Equipment/Software/Tools Required

1. Analog Discovery2 Kit with PC, USB Cable.
2. Analog IC's: TL082, 741C, 555 and 565.
3. Xilinx ISE 9.2isoftware.
4. Computer loaded with Windows XP, MATLAB software.

5. Books and Materials

Text Book(s) :

1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 2nd edition, 2003. Education, 2007
2. M.Morris Mano &Micheal D. Ciletti, Digital *Design*, Pearson, 5th edition, 2013.
3. A.V. Oppenheim, A.S. Willsky and S.H. Nawab. *Signals and Systems*, Pearson Education, 2nd edition, 1997.

Reference Book(s)

1. Ramakanth A. Gayakwad, *Op-Amps and Linear ICs*, PHI, 4th edition, 1987.
2. R.D. Sudhakar Samuel, *Digital Logic Design*, Elsevier.
   A.Anand Kumar. *Signals and Systems*, Prentice Hall of India, 2012.

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COURSE STRUCTURE

A30216-PROGRAMMABLE LOGIC CONTROLLERS

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

1. Course Description

Course Overview

The primary objective of this course is Introduction to the purpose, functions, and operations of the PLC in industrial applications, Identification of various components of the PLC, Introduction to PLC ladder logic and basic programming concepts, establishing communications with the PLC, PLC timer and counter concepts and programming Applications, PLC Arithmetic Operations and Loop Instructions and its applications.

Course Pre/co requisites

1. A30002-Mathematics-I
2. A30010- Mathematics-II
3. A30419-Electronic Circuits-II

2. Course Outcomes (COs)

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

A30216.1 Explain the operations and basic applications of PLCs using Switches.

A30216.2 Acquire knowledge on usage of timers in different applications of PLCs

A30216.3 Interpret the function of counters and apply counter in different applications of PLCs

A30216.4 Understand the concepts of PLC Arithmetic Operations**,** data handling functions and apply the concepts in different applications of PLCs

3. Course Syllabus

UNIT-I

PLC Basics: PLC System, Programming Formats, Construction of PLC Ladder Diagrams, Devices Connected To I/O Modules. PLC Programming: Input Instructions, Outputs. Operational Procedures, Programming Examples Using Contacts and Coils,Normally Closed Contact in Series Connection,Block in Parallel Connection , Interlock Control Circuit, Latching Control Circuit,Entry/Exit Control of the Underground Car Park, Forward/Reverse Control for the Three-Phase Asynchronous Motor using PLC.

UNIT-II

PLC Timers: Timer Functions & Industrial Applications, Delay OFF Program, Delay ON Program, Delay ON/OFF Program, Pulse-Width Modulation, Artificial Fishpond Water Level Monitoring System (Flashing Circuit), Automatic Door Control, Automatic Liquids Mixing Control System,Automatic Coffee Maker, Traffic Lights Control using PLC.

UNIT-III

PLC Counters: Counter Functions & Industrial Applications, Product Mass Packaging, Daily Production Record, Products Amount Calculation, 24-hour Clock Operated by 3 Counter, A B-phase Pulse High-speed Counter using PLC.

UNIT-IV

Arithmetic Operations: Arithmetic Functions, Number Comparison Functions, Number Conversion Functions, Accurate Pipe Flow Measurement, INC/DEC - Fine Tuning by JOG Control, NEG - Displacement Reverse Control using PLC

UNIT-V

Loop Instruction Design Examples: SKIP, Master Control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep Functions and Their Applications**,** Reservoir Level Control, Fire Alarm in the Office, Auto Lock up system in the Supermarket using PLC.

4. Books and Materials

REFERENCES:

1. Kelvin T. Erickson, *Programmable Logic Controllers: An Emphasis on design & application*, Dogwood Valley Press, 2011.

TEXT BOOKS:

1. John W. Webb & Ronald A. Reiss, *Programmable Logic Controllers- Principles and Applications,* Fifth Edition, ELSEVIER I.td., 2009.
2. William Bolton, Newnes, *Programmable Logic Controllers,* 5th Edition, ELSEVIER Ltd., 2009.

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – ELECTRICALAND ELECTRONICSENGINEERING

V SEMESTER (III Year)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30217	Power System Transmission and Distribution	PC	3	0	0	3	40	60	100
A30218	Power Electronics	PC	3	0	0	3	40	60	100
A30219	Electrical Measurements and Instrumentation	PC	3	0	0	3	40	60	100
	Professional Elective – I	PE	3	0	0	3	40	60	100
	Open Elective-I	OE	3	0	0	3	40	60	100
A30220	Power Electronics Laboratory	PC	0	0	3	1.5	40	60	100
A30221	Electrical Measurements and Instrumentation Laboratory	PC	0	0	3	1.5	40	60	100
A30222	Skill advanced course (JAVA Programming Laboratory)	SC	1	0	2	2	40	60	100
A30033	Indian Constitution	MC	2	0	0	0	100*	0	100*
A30223	Internship 2 Months (Mandatory) during summer vacation (to be evaluated during V Semester)	PW	0	0	0	1.5	100	0	100
A30229	Community Service Project	PW							
TOTAL			17	01	10	21.5	420	480	900

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

VI SEMESTER (III Year)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30224	Power Semiconductor Drives	PC	3	0	0	3	40	60	100
A30225	Power System Analysis	PC	3	0	0	3	40	60	100
A30431	Microprocessors and Microcontrollers	PC	3	0	0	3	40	60	100
	Professional Elective –II	PE	3	0	0	3	40	60	100
	Open Elective –II	OE	3	0	0	3	40	60	100
A30226	Power Systems Simulation Laboratory	PC	0	0	3	1.5	40	60	100
A30227	Electrical Drives Simulation Laboratory	PC	0	0	3	1.5	40	60	100
A30434	Microprocessors and Microcontrollers Laboratory	PC	0	0	3	1.5	40	60	100
A30228	**Skill advanced course** (DBMS Lab)	SC	1	0	2	2	100	0	100
A30034	Gender Sensitization	MC	2	0	0	0	100*	0	100*
TOTAL			17	01	08	21.5	420	480	900
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									

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

PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

Professional Electives:

Professional Elective – 1	
Course Code	**Title of the Course**
A30251	Special Electrical Machines
A30252	Energy Sources
A30253	Advanced Control Systems

Professional Elective – 2	
Course Code	**Title of the Course**
A30254	Hybrid Electric Vehicles
A30255	Smart Grid Technology
A30256	Digital Control Systems

Professional Elective – 3	
Course Code	**Title of the Course**
A30257	FACTS and its Applications
A30258	High Voltage Engineering
A30259	PLC and its Applications

Professional Elective – 4	
Course Code	**Title of the Course**
A30260	HVDC Transmission
A30261	Electrical Distribution Systems
A30262	AI Techniques in Power Systems

Open Electives:

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

COURSE STRUCTURE

V – SEMESTER

V SEMESTER (III Year)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30217	Power System Transmission and Distribution	PC	3	0	0	3	40	60	100
A30218	Power Electronics	PC	3	0	0	3	40	60	100
A30219	Electrical Measurements and Instrumentation	PC	3	0	0	3	40	60	100
	Professional Elective – I	PE	3	0	0	3	40	60	100
	Open Elective-I	OE	3	0	0	3	40	60	100
A30220	Power Electronics Laboratory	PC	0	0	3	1.5	40	60	100
A30221	Electrical Measurements and Instrumentation Laboratory	PC	0	0	3	1.5	40	60	100
A30222	**Skill advanced course (OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY)**	SC	1	0	2	2	40	60	100
A30033	Indian Constitution	MC	2	0	0	0	100*	0	100*
A30223	**Internship 2 Months (Mandatory) during summer vacation (to be evaluated during V Semester)**	PW	0	0	0	1.5	100	0	100
TOTAL			17	01	10	21.5	420	480	900

COURSE STRUCTURE

A30217 – POWER SYSTEM TRANSMISSION AND DISTRIBUTION

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

1. Course Description

Course Overview

The purpose of this course is to enable the student to acquire knowledge on Power Transmission and Distribution systems. The objective of this course is to introduce the transmission line parameters, types of transmission lines and their performance analysis. This course also gives the emphasis on mechanical design of transmission lines, cables, insulators and sag. In addition this course also focuses on the concepts of distribution system, types of faults and protection. This course is used to solve the power system problems using computer methods.

Course Pre/corequisites

1. A30205 - Electrical Circuit Analysis
2. A30207 - Electro Magnetic Fields

2. Course Outcomes (COs)

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

A30217.1 Apply the knowledge of electromagnetic fields to calculate the parameters of transmission lines and underground cables.

A30217.2 Analyze the performance of various transmission lines, underground cables and overhead insulators.

A30217.3 Design mechanical transmission lines using corona phenomenon, Sag and Tension.

A30217.4 Analyze the distribution system, types of faults and protective devices.

3. Course Syllabus

UNIT-I

Transmission Line Parameters: Types of Conductors – ACSR, Bundled and Stranded, Resistance for Solid Conductors, Skin Effect, Calculation of Inductance and Capacitance for Single Phase and Three Phase, Single and Double Circuit Lines, GMR & GMD, Symmetrical and Asymmetrical Conductor Configuration with and without Transposition, Effect of Ground on Capacitance.

UNIT-II

Performance of Transmission Lines: Classification of Transmission Lines, Equivalent Circuits – Nominal- T and Pie, Regulation and Efficiency of transmission Lines - Evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Surge Impedance and Loading, Wavelengths and Velocity of Propagation, Ferranti Effect and Charging Current.

UNIT-III

Mechanical Design of Transmission Lines:

Overhead Line Insulators - Types of Insulators, String Efficiency and Methods for Improvement, voltage distribution and calculation of string efficiency, Capacitance Grading and Static Shielding, **Corona -** Corona Phenomenon, Factors Affecting Corona, Critical Voltages, Power Loss and Radio Interference.

Sag and Tension Calculations - Sag and Tension with Equal and Unequal Heightsof Towers, Effect of Wind and Ice on Weight of Conductor.

UNIT-IV

Underground Cables: Types of Cables, Construction, Calculation of Insulation Resistance and Stress in Insulation, Capacitance of Single and 3-Core Belted Cables, Types of Grading.

UNIT-V

Faults and Protection of Distribution System: Objectives of distribution system, types of common faults, Protective Devices - Fuses, Circuit Autoreclosers, line sectionalizers and circuitbreakers.

4. Books and Materials

Text Book(s)

1. C.L.Wadhwa, *Electrical Power Systems*, New Age International (P) Limited, 6th edition, 2010.
2. M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti, *A Text Book on Power System Engineering*, DhanpatRai& Co Pvt. Ltd., 2003.

Reference Book(s)

1. D. P. Kothari and I. J. Nagrath, *Power System Engineering*, McGraw Hill Education (India) Pvt. Ltd., 2nd edition, 2008, 23rd reprint 2015.
2. V.K. Mehta and Rohit Mehta, *Principles of Power Systems*, 4th revised edition, S.Chand, reprint 2010.
3. TuranGonen, *Electric Power Distribution System Engineering*, McGraw Hill, 1986.

COURSE STRUCTURE

A30218 – POWER ELECTRONICS

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

1. Course Description

Course Overview

This course deals with switched-mode converter circuits for controlling and converting electrical power with high efficiency. This course provides an introduction to the power electronics devices for the control, conversion of electrical power and their practical applications in power electronics. This course also focuses on the regulation of voltage, current and power using DC-DC converters, AC - DC rectifier, DC - AC inverter and AC - AC cycloconverter. In this course high power applications of power electronic devices by their switching and static characteristics are discussed. Further this course also focuses on harmonic reduction in the converters by employing PWM techniques. The converters discussed in this course will be applied in aerospace industry, commercial sector, industrial sector, domestic equipments, telecommunications, transportation and utility systems.

Course Pre/corequisites

A30410-Electronic Circuits-I

2. Course Outcomes (COs)

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

A30218.1 Illustrate the fundamental concepts and techniques used in power electronic circuits.

A30218.2 Analyze the performance and protection techniques of power electronic devices.

A30218.3 Analyze the operation and performance of AC-DC, DC-DC, DC-AC and AC-AC converters.

A30218.4 Design a suitable power electronic converter circuit for given applications.

A30218.5 Apply PWM techniques to improve the performance of DC-DC and DC-AC converters.

3. Course Syllabus

UNIT-I

Power Switching Devices: Classification of Switching Devices Based on Frequency and Power Handling Capacity,Power Diodes, TRIACs, GTOs, Power Transistor (BJT), Power MOSFET, Power IGBT I-V Characteristics,Silicon Controlled Rectifiers (SCR's)- Static Characteristics, Turn On and Turn Off Methods, Dynamic Characteristics of SCR, Two Transistor Analogy.

Triggering Circuits- R, RC, UJT, Series and Parallel Connections of SCR's, protection against dv/dt and di/dt, design of Snubber circuit, Ratings of SCR's, BJT, IGBT, numerical problems.

UNIT-II

Phase Controlled Converters: Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL Loads and RLE Load– Derivation of Average Load Voltage and Current – Line Commutated Inverters -Active

and Reactive Power Inputs to the Converters without and with Free Wheeling Diode, Effect of Source Inductance – Numerical Problems.

Three Phase Line Commutated Converters – Three Pulse and Six Pulse Converters – Mid Point and Bridge Connections - Average Load Voltage with R and RL Loads – Effect of Source Inductance–Dual Converters (Both Single Phase and Three Phase) - Waveforms –Numerical Problems.

UNIT-III

Choppers: Basic chopper operation, control strategies, Step down and Step up choppers- Derivation of load voltage and load currents with R, RL and RLE loads, Chopper configurations. Power circuit of a Buck, Boost and Buck-Boost converters: Analysis and waveforms at steady state, numerical problems.

UNIT-IV

AC Voltage Controllers and Cycloconverters:Single phase AC voltage controllers - Two SCRs in anti-parallel with R and RL loads, derivation of rms load voltage and load current, numerical problems.

Cycloconverters - Single phase midpoint and Bridge type (step-up and step-down operations) with R and RL loads.

UNIT-V

Single Phase Inverters: Basic operation, voltage source inverters, basic series and parallel inverters, current source inverter, Single Phase Half and Full Bridge Inverters.

Voltage Control Techniques for Inverters: Pulse Width Modulation Control- Harmonic Reduction Techniques, Numerical Problems, Three- phase VSI in 120° And 180° Modes of Conduction.

4. Books and Materials

Text Book(s)

1. P.S.Bimbhra, *Power Electronics*, Khanna publishers, Delhi, 4th edition, 2008.
2. M.D.Singh and K. B. Khanchandani,*PowerElectronics*, McGraw Hill education (India) Pvt. Ltd., 2nd edition, 2007, 23rd reprint 2015.

Reference Book(s)

1. M H Rashid, *Power electronics: Circuits, Devices, and Applications*, Pearson education India, 3rdedition, 2009.
2. N Mohan and T M Undeland, *Power Electronics: Converters, Applications and Design*, John Wiley & Sons, 2ndedition, 2007.
3. P. C. Sen(2001), *Power Electronics*, Tata McGraw Hill publishing, 30th edition, New Delhi.

COURSE STRUCTURE

A30219-ELECTRICAL 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	40	60	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different electrical measuring instruments used to measure electrical quantities. This course provides the information on analog and digital methods of measuring physical quantities. The minimisation 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

1. A30201–Fundamentals of Electrical Engineering
2. A30205-Electrical Circuit Analysis

2. Course Outcomes (COs)

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

A30219.1 Categorise various electrical instruments used for measuring electrical parameters.

A30219.2 Analyze the errors and compensations in various electrical measuring instruments

A30219.3 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.

A30219.4 Estimate the unknown quantities of resistance, inductance and capacitance using bridges

A30219.5 Apply transducers, digital meters and CRO for measuring electrical parameters

3. Course Syllabus

UNIT-I

Introduction to Measuring Instruments: Classification of measuring instruments, Performance Characteristics- Static and Dynamic, types of errors and torques, ammeter and voltmeter-PMMC, MI and dynamometer instruments, expression for deflection and control torque, errors and compensation, extension of range of ammeters and voltmeters using shunts and series resistances.

UNIT-II

Potentiometers and Instrument Transformers: DC Crompton Potentiometers- Principle and operation, standardization, measurement of unknown resistance, voltage and current. AC potentiometers-polar and coordinate type, standardization and applications.Instrument transformers- CT and PT, ratio and phase angle error.

UNIT-III

Measurement of Power and Energy: Measurement of Power- Power measurements in DC and AC circuits. EDM wattmeter - construction, working, torque equation, shape of scale, errors & compensations and LPF wattmeter.Measurement of three phase active and reactive power for balanced and unbalanced loads.

Measurement of Energy: Single phase induction type energy meter - construction, working, driving and braking torques, lag adjustment devices, errors & compensations. Three phase energy meter.

UNIT-IV

DC and AC Bridges: Measurement of Resistance- Methods of measuring low, medium, high resistance, Wheatstone bridge, carry foster, Kelvin's double bridge, loss of charge method, Measurement of Inductance-Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge; Measurement of Capacitance-Desauty's bridge, Schering bridge. Measurement of frequency: Wein's bridge.

UNIT-V

Transducers and Digital Measurements: Transducers: Classification, Principle of Operation of Resistive, Inductive, Capacitive Transducers, Characteristics and Choice of Transducers, LVDT, Strain Gauge and Gauge Factor.

Cathode ray oscilloscope: Cathode ray tube, time base generator, horizontal and vertical amplifiers, CRO probes, applications of CRO, measurement of phase and frequency, Lissajous patterns.

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, 14th edition, 2014.

Reference Book(s)

1. U.A.Bakshi, A.V.Bakshi, *Electrical measurements and Instrumentation*, Technical publications, 1st edition, 2009.
2. E.W.Golding&F.C.Widdis, *Electrical Measurements and Measuring Instruments*, Wheeler publishers, 5th edition, 1997.
3. H S Kalsi, *Electronic Instrumentation*, Tata McGraw-Hill, 3rd edition, 2010.

COURSE STRUCTURE

A30220 – POWER ELECTRONICS LABORATORY

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

1. Course Description

Course Overview

The objective of this course is to analyse the performance characteristics of SCR. The performance characteristics of AC-DC, DC-AC, DC-DC and AC-AC converters at different load conditions are analysed. This lab course also helps the students to design power electronic converters using MATLAB simulation.

Course Pre/corequisites

1. A30202Fundamentals of Electrical Engineering Laboratory
2. A30218 Power Electronics

2. Course Outcomes (COs)

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

A30220.1 Analyze the performance characteristics of SCR firing and commutation circuits.

A30220.2 Plot the performance characteristics of AC-DC, DC-AC, DC-DC and AC-AC converters with R and RL Loads.

A30220.3 Apply the knowledge of MATLAB to plot the characteristics of full converter, inverter and forced commutation circuits

3. Course Syllabus

List of Experiments:

1. Gate firing circuits for SCRs
2. Single phase A.C. Voltage controller with R and RL loads
3. Single phase fully controlled bridge converter with R and RL loads
4. Forced commutation circuits
5. DC Jones Chopper
6. Single phase parallel inverter with R and RL loads
7. Single phase cycloconverter with R and RL loads
8. Single phase half controlled bridge converter with R and RL loads
9. Three phase half controlled bridge converter with R load
10. Single phase series inverter with R and RL loads
11. Single phase bridge converter with R and RL loads
12. Single phase dual converter with R and RL loads
13. MATLAB simulation of single phase full converter using RLE loads and single phase AC
14. Voltage Controller using RLE loads
15. MATLAB simulation of Resonant pulse commutation circuit and Buck chopper
16. MATLAB simulation of Single phase inverter with PWM control

4. Laboratory Equipment/Software/Tools Required

1. SCR Firing Circuit Trainer Kit
2. Single Phase Half Controlled Bridge Converter Power Circuit Trainer Kit
3. Single Phase Fully Controlled Bridge Converter Power Circuit Trainer Kit
4. Forced Commutation Circuit Trainer Kit
5. Single Phase ACVoltage Controller Trainer Kit
6. Single Phase cycloconverter Power Circuit Trainer Kit
7. DC Jones Chopper Power Circuit Trainer Kit
8. Single Phase Series Inverter Power Circuit with Firing circuit Kit
9. Single Phase Parallel Inverter Power Circuit with Firing Circuit Kit
10. Single Phase Dual Converter Power Circuit with Firing Circuit Module
11. Three Phase Half Controlled Bridge Converter Power Circuit Trainer Kit
12. MATLAB 9.0 Simulation Software

5. Books and Materials

Text Book(s)

1. P S Bimbhra**,** *Power Electronics,*Khanna Publishers, Delhi, 4th edition, 2008.
2. M. D. Singh and K.B. Khanchandani,*PowerElectronics*,McGraw Hill education (India) Pvt. Ltd., 2nd edition, 2007, 23rd reprint 2015.

Reference Book(s)

1. N Mohan and T M Undeland, *Power Electronics: Converters, Applications and Design*, John wiley& Sons, 2nd edition, 2007.
2. M H Rashid, *Power electronics: circuits, devices, and applications*, Pearson Education India, 3rd Edition, 2009.
3. P.C.Sen, *Power Electronics*, 30th edition, Tata McGraw Hill publishing, New Delhi, 2001.

COURSE STRUCTURE

A30221 – ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY

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

1. Course Description

Course Overview

This Course is for providing the basic concepts of measuring the different electrical parameters with precision& calibration of different types of instruments and also to impart knowledge on the working of the different types of measuring instruments. This course is designed to measure Resistance, Inductance and Capacitance of different ranges using bridge circuits. In this course the calibration of PMMC, MI, Electrodynamometer and energy meters done. Applications of this course are: Monitoring of processes and operations, control of processes and operations and experimental engineering analysis.

Course Pre/corequisites

1. A30201 – Fundamentals of Electrical Engineering
2. A30205 - Electrical Circuit Analysis
3. A30219 - Electrical Measurements and Instrumentation

2. Course Outcomes (COs)

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

A30221.1 Estimate resistance, inductance and capacitance of electrical circuits using bridges and dielectric strength of transformer oil

A30221.2 Calculate the percentage error of various measuring instruments, LVDT, and resistance strain gauge

A30221.3 Evaluate 3-Φ active power and reactive power of different loads.

A30221.4 Calibrate single phase energy meter and DC Crompton potentiometer.

3. Course Syllabus

1. Kelvin's Double Bridge – Measurement of very low Resistance values – Determination of Tolerance.
2. Schering Bridge for measurement of Capacitance values.
3. Anderson Bridge for measurement of Inductance values.
4. Crompton D.C. Potentiometer – Calibration of PMMC Voltmeter
5. Dielectric Oil Testing Using H.T. Testing Kit
6. LVDT Characteristics and Calibration
7. Resistance Strain Gauge – Strain Measurement and Calibration
8. Calibration of Single-Phase Energy Meter using Phantom loading method with RSS meter as standard
9. Power Measurement by 3-Voltmeter Method
10. Power Measurement by 3-Ammeter Method
11. Measurement of 3 Phase Reactive Power with Single-Phase Wattmeter.
12. Measurement of 3 Phase Power with Two Watt Meter Method (Balanced &Un balanced).

4. Laboratory Equipment/Software/Tools Required

1. Kelvin's Double Bridge
2. Schering Bridge
3. Anderson Bridge
4. Crompton D.C. Potentiometer
5. H.T. Oil Testing Kit
6. LVDT
7. Resistance Strain Gauge
8. Single-Phase Energy Meter

5. Books and Materials

Text Book(s) :

1. A.K.Sawhney, *A Course in Electrical & Electronic Measurement & Instruments*, 19th edition, DhanpatRai& Co. publications, New Delhi,2011.

Reference Book(s)

1. J.B.Gupta,*Electronics and Electrical Measurements and Instrumentation*, 10th edition, S.K.Kataria sons, New Delhi,2010.

2.E.W.Golding,F.C.Widdis,*Electrical Measurements and Measuring Instruments*,5thedition, Wheeler publishing, New Delhi,2010.

COURSE STRUCTURE

A30222 –JAVA PROGRAMMING 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 course provides hands on experience in applying object oriented concepts using Java. The learner will be able to practically handle problems related to arrays, Strings, interfaces, inheritance, packages, exception handling, multithreading, files and swings and give effective solution programmatically. This helps the students to choose their career as software engineers.

Course Pre/corequisites

1. A30501- Computer Programming
2. A30588- Object Oriented Programming Using Java

2. Course Outcomes (COs)

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

A30222.1 Design solutions for the problems of general purpose applications using object oriented concepts.

A30222.2 Generate reusable code using inheritance, user defined packages and interface

A30222.3 Write robust and efficient code using exception handling and multithreading concepts

A30222.4 Implement collection frameworks and file handling techniques to store and retrieve data

A30222.5 Design user interface using swings

3. Course Syllabus

Lab Experiments:

1. Installation of Java software and study of any integrated development environment. Learn to compile, debug and execute java programs.

Arrays

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

Inheritance

3. Write a java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub classes override area(s) so that it returns the area of a rectangle and triangle respectively.

4. Develop a java application for Banking transactions by using inheritance concept.

5. Develop a java application for Daily Attendance by using the concept Dynamic Binding.

Interfaces

6. 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).

7. Develop a java application for ticket reservation by using the concept of polymorphism.

Exception Handling

8. 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.

Multithreading

9. 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.

10. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

Files

11. 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.

12. Write a java program to find and replace pattern in a given file.

Collection Frameworks:

13. Implement collection frameworks to retrieve data.

Event Handling:

14. Write a java program to handle mouse events.
15. Write a java program to handle keyboard events.

Swings:

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

17. 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.

18. Write a java program that allows conduction of object type examination containing multiple choice questions, and true/false questions. At the end of the examination when the user clicks a button the total marks have to be displayed in the form of the message.

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Text Book(s)

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

Reference Book(s)

1. T. V. Suresh Kumar, B.Eswara Reddy and P.Raghavan.*Programming with Java.*Pearson, 2011.

2. Paul Deitel and Harvey Deitel.*Java – How to Program.* Pearson, 2nd Edition, 2012.

3.Kathy Sierra and Bert Bates. *Head First Java.* O'Reilly,2nd Edition, 2005.

COURSE STRUCTURE
A30033– INDIAN CONSTITUTION

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

1. Course Description

Course Overview

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

Course Pre/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:

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

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

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

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

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

A30033.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

3. Course Syllabus

UNIT - I

Introduction to Indian Constitution: Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT - II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, Prime Minister and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions.

UNIT - III

State Government and its Administration: Governor - Role and Position – Chief Minister and Council of ministers, State Secretariat: Organization, Structure and Functions.

UNIT - IV

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

UNIT - V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissioner ate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women.

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE

VI – SEMESTER

VI SEMESTER (III Year)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30224	Power Semiconductor Drives	PC	3	0	0	3	40	60	100
A30225	Power System Analysis	PC	3	0	0	3	40	60	100
A30431	Microprocessors and Microcontrollers	PC	3	0	0	3	40	60	100
	Professional Elective –II	PE	3	0	0	3	40	60	100
	Open Elective –II	OE	3	0	0	3	40	60	100
A30226	Power Systems Simulation Laboratory	PC	0	0	3	1.5	40	60	100
A30227	Electrical Drives Simulation Laboratory	PC	0	0	3	1.5	40	60	100
A30434	Microprocessors and Microcontrollers Laboratory	PC	0	0	3	1.5	40	60	100
A30228	**Skill advanced course** (DBMS Laboratory)	SC	1	0	2	2	100	0	100
A30034	Gender Sensitization	MC	2	0	0	0	100*	0	100*
TOTAL			17	01	08	21.5	420	480	900

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

COURSE STRUCTURE
A30222 – POWER SEMICONDUCTOR DRIVES

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

1. Course Description

Course Overview

This course is an extension of power electronics applied to electric drives. It covers the advanced speed control techniques using power electronic converters that are used in industry. This course deals with single phase and three phase converter based DC motor control, Chopper based control of DC motors, Induction motor based control methods with stator, rotor control and synchronous motor control techniques. The AC and DC drives studied in this course are applied in transport system, paper industry, textile mills and robotics.

Course Pre/corequisites

1. A30218 - Power Electronics
2. A30206 - Electrical Machines-I
3. A30212 - Electrical Machines-II

2. Course Outcomes (COs)

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

A30222.1 Identify a suitable electric drive system for desired application.

A30222.2 Apply 1-phase & 3- phase controlled converters for speed control operation of DC drives.

A30222.3 Apply the knowledge of DC-DC Converter and dual converter for speed and torque control of DC Drives.

A30222.4 Apply the knowledge of AC voltage controller and cyclo-converter to control the speed of an induction motor and synchronous motor.

3. Course Syllabus

UNIT-I

Converter fed DC Motors: Classification of electrical drives, dynamic control of a drive system, stability analysis, Introduction to thyristor controlled drives, single phase, three phase semi and fully controlled converters connected to D.C separately excited motor and D.C series motors. Speed and torque equations and characteristics.

UNIT-II

Four Quadrant Operations of DC Drives: Introduction to four quadrant operation – motoring operations, electric braking – plugging, dynamic and regenerative braking operations. Four quadrant operation ofD.C motors by dual converters – closed loop operation of dc motor (block diagram only)

UNIT-III

Chopper fed DC Motors: Single quadrant, two quadrant and four quadrant chopper fed DC separately excited motor and DC series motor – continuous current operation – output voltage and current wave forms – speed and torque equations – speed torque characteristics.

UNIT-IV

Control of Induction Motors: Stator voltage control of induction motor.ac voltage controllers- speed torque characteristics - stator frequency control. Voltage source and current source inverter - PWM control – comparison of VSI and CSI operations –closed loop operation of induction motor drives (block diagram only) – principles of vector control method. Static rotor resistance control–slip power recovery – V/F control of induction motor and speed torque characteristics.

UNIT-V

Control of Synchronous Motors: Separate &self-control of synchronous motors – operation of self-controlled synchronous motors by VSI and CSI cycloconverters. load commutated CSI fed synchronous motor- speed torque characteristics– closed loop control operation of synchronous motor drives (block diagram only), introduction to variable frequency control.

4. Books and Materials

Text Book(s)

1. G K Dubey,*Power semiconductor controlled drives*, Prentice Hall, 1995.
2. B.K.Bose, *Modern Power Electronics and AC Drives*, PHI, 2002.

Reference Book(s)

1. MD Singh and K B Khanchandani,*Power Electronics*, Tata McGraw-Hill Publishing company,2008.
2. M.H.Rashid,*Power Electronic Circuits, Devices and applications*, PHI,2005.
3. VedamSubramanyam,*Electric drives Concepts and Applications*, Tata McGraw Hill Publications, 2nd Edition, 2011.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30223 – POWER SYSTEM ANALYSIS

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

1. Course Description

Course Overview

In recent days the usage of electrical energy has drastically increased. It is very easy to analyse, control and monitor electrical power with the help of computer application. The objective of this course is to deal with different computer methods to control the power systems. The concepts of Y_{bus}, Z_{bus}, load flow studies, short circuit analysis and power flow studies are discussed. It also deals with steady state and transient stability analysis of power systems. The concepts acquired in this course will help in studying SCADA and automation of electrical energy.

Course Pre/corequisites

1. A30201 – Fundamentals of Electrical Engineering
2. A30205 - Electrical Circuit Analysis
3. A30217 - Power System Transmission and Distribution

2. Course Outcomes (COs)

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

A30223.1 Apply computational methods to determine transmission line parameters.

A30223.2 Apply load flow methods to examine the load flow studies.

A30223.3 Analyze symmetrical and unsymmetrical power system faults.

A30223.4 Apply the methods to improve the steady state and transient stability of power systems.

3. Course Syllabus

UNIT-I

Power System Network Matrices: Graph theory: definitions, bus incidence matrix, and formation of y_{bus} by direct and singular transformation methods. formation of z_{bus}: partial network, algorithm for the modification of z_{bus} matrix for addition branch and link. modification of z_{bus} for the changes in network.

UNIT-II

Power Flow Studies-I: Necessity of power flow studies – data for power flow studies – derivation of static load flow equations – load flow solutions using gauss seidel method, acceleration factor, load flow solution - algorithm and flowchart - numerical problems (max. 3 - buses) determination of bus voltages (one iteration only) and finding line flows / losses for the given bus voltages.

UNIT-III

Power Flow Studies-II: Newton Raphson method in rectangular and polar co-ordinates form- load flow solution derivation of Jacobian elements, algorithm and flowchart. Decoupled and fast decoupled methods.Comparison of different methods – dc load flow.

UNIT-IV

Short Circuit Analysis: Per-unit system: reactance diagrams power system (single line diagrams). 3 ϕ fault analysis: short circuit current and MVA calculations, application of series reactors.

Symmetrical Components: Transformation, positive, negative and zero sequence components, voltages, currents and impedances. Sequence networks: positive, negative and zero sequence networks.

Unsymmetrical Fault Analysis:LG, LL, LLG faults with and without fault impedances.

UNIT-V

Power System Stability Analysis: Elementary concepts of steady state, dynamic and transient stabilities. description of steady state stability power limit, transfer reactance, synchronizing power coefficient, power angle curve and determination of steady state stability and methods to improve steady state stability - swing equation derivation, solution, determination of transient stability by equal area criterion, application of equal area criterion, critical clearing angle calculation. Methods to improve stability.

4. Books and Materials

Text Book(s)

1. Grainger and Stevenson, *Power Systems Analysis,*TataMcGraw-hill, 2005.
2. I.J.Nagrath and D.P.Kothari, *Modern Power system Analysis,* Tata McGraw-Hill, 2nd edition, 2003.

Reference Book(s)

1. M A Pai, *Computer Techniques in Power System Analysis,* Tata McGraw-hill 2nd edition, 2005.
2. S. Sivanagaraju and B. V.Rami Reddy, *Power Systems Analysis,* University science press, 2nd edition, 2011.
3. HadiSaadat, *Power Systems Analysis,* McGraw-Hill higher education, 2nd edition.

COURSE STRUCTURE

A30431 – MICROPROCESSORS AND MICROCONTROLLERS

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

1. Course Description

Course Overview

This course provides an introduction to 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

A2419 Electronic Circuits-II

2. Course Outcomes (COs)

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

A30431.1 Analyze 8086 microprocessor and MSP430 microcontroller architectures

A30431.2 Develop programs using 8086 microprocessor and MSP430 microcontroller

A30431.3 Make use of peripherals of MSP430 to interface I/O devices

A30431.4 Apply serial communication protocols for interfacing serial devices.

A30431.5 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 risk MSP430 features, block diagram, MSP430g2x53–block diagram, memory address space, register set, addressing modes, 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, activities standby current consumption. Timer& real time clock (RTC), 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*, 3rdedition, TMH publications

2. John H. Davies,*MSP430 microcontroller basics,* 1stedition, 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

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30224 – POWER SYSTEMS SIMULATION LABORATORY

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

1. Course Description

Course Overview

The student will be able to learn model of transmission lines, Ferranti effect, Formation of Y & Z bus, Load flow analysis, Short circuit analysis and solution of swing equation.

Course Pre/requisites

A30223 - Power System Analysis

2. Course Outcomes (COs)

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

A30224.1 Develop a program to simulate Ferranti effect

A30224.2 Develop a program to model transmission lines

A30224.3 Develop a program for formation Y-Bus and Z-Bus

A30224.4 Develop a program for load flow solution

A30224.5 Develop a program for short circuit analysis

A30224.6 Develop a Simulink model for evaluating transient stability

3. Course Syllabus

1. MATLAB program to simulate Ferranti effect
2. MATLAB program to model transmission lines
3. Formation of Y - Bus using Software Simulation
4. Formation of Z - Bus using Software Simulation
5. Gauss – Seidel Load Flow Analysis using Software Simulation
6. Fast Decoupled Load Flow Analysis using Software Simulation
7. LG Fault analysis using Software Simulation
8. LLG Fault analysis using Software Simulation
9. Simulink model for evaluating transient stability of single-machine connected to infinite bus
10. Solution of Swing equation –using Software Simulation

4. Laboratory Equipment/Software/Tools Required

1. MATLAB SOFTWARE

5. Books and Materials

Text Book(s)

1. I.J.Nagrath&D.P.Kothari, *Modern Power system Analysis*, Tata McGraw-Hill publishing company, 4th edition, 2011.

Reference Book(s)

1. Y. Kirani Singh, B. Chaudhuri*, MatlabProgramming* ,PHI learning pvt. ltd.

COURSE STRUCTURE

A30225 – ELECTRICAL DRIVES SIMULATION LABORATORY

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

2. Course Description

Course Overview

The objective of this course is to analyse the performance characteristics of electrical drives. The performance characteristics of DC motor drives, induction motor drives fed with various types of converters are analysed. This lab course also helps the students to design electrical drives using MATLAB simulation.

Course Pre/corequisites

1. A30218 Power Electronics
2. A30220 Power Electronics Laboratory
3. A30222 Power Semiconductor Drives

3. Course Outcomes (COs)

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

A30225.1 Apply the knowledge of MATLAB and analyze the performance characteristics of DC and AC drives.

A30225.2 Evaluate the performance characteristics of inverter fed induction motor drive using MATLAB.

A30225.3 Analyze the performance of electrical drives and design specifications.

3. Course Syllabus

List of Experiments:

1. Simulation of Three phase voltage source converter with space vector PWM simulation using MATLAB
2. Simulation of Speed control of DC Motor using BJT-H bridge simulation using MATLAB
3. Simulation of Three phase thyristor converter simulation using MATLAB
4. Simulation of Three phase three level PWM converter simulation using MATLAB
5. Simulation of Three phase space – vector PWM converter simulation using MATLAB
6. Simulation of Chopper fed DC motor drive simulation using MATLAB Gate firing circuits for SCRs
7. Simulation of v/f control of induction motor drive using DC link converter
8. Simulation of three phase rectifier fed separately excited DC motor drive
9. Simulation of induction motor and DC motor from direct power supply with using any power electronic converter
10. Simulation of Six pulse cycloconverter fed induction motor drive.

4. Laboratory Equipment/Software/Tools Required

1. MATLAB 9.0 Simulation Software

5. Books and Materials

Text Book(s)

1. G. K.Dubey,*Power semiconductor controlled drives*, Prentice Hall of India, 1995.

2. B.K.Bose, *Modern Power Electronics and AC Drives*, PHI, 2002.

Reference Book(s)

1. M H Rashid, *Power electronics: circuits, devices, and applications*, Pearson Education India, 3rdEdition, 2009.

2. Troy Siemers,*An Introduction to Matlab and Mathcad, APEX Calculus,* 2011.

COURSE STRUCTURE

A30434 – 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	40	60	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. A2402 – Digital Logic Design
2. A2429 – Microprocessors and Microcontrollers

2. Course Outcomes (COs)

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

A30434.1 Develop assembly language programs using EMU8086 emulator.

A30434.2 Execute 8086 ALPs for arithmetic, logical, string, call operations.

A30434.3 Build programs of MSP430 using embedded C.

A30434.4 Interface LEDs, push buttons, potentiometer to MSP430.

A30434.5 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

COURSE STRUCTURE

A30228 – DBMS LABORATORY

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

1. Course Description

Course Overview

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

Course Pre/corequisites

A30582- Fundamentals of DBMS

2. Course Outcomes (COs)

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

A30509.1 Design Database tables for the given problem

A30509.2 Use appropriate querying processing technique to access the dataA30509.3 Apply suitable normal form to eliminate data redundancy A30509.4 Develop PL/SQL routines for reusability of code

A30509.5 Apply appropriate triggering concepts for automation and performance

3. Course Syllabus

Course Content:		
TASK-1	**CREATION OF TABLES:**	

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

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

a. Add a column commission with domain to the Employee table.
b. Insert any five records into the table.
c. Update the column details of job
d. Rename the column of Employ table using alter command.
e. Delete the employee whose empno is19

TASK-2

Create **department** table with the followingstructure.

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

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

TASK-3

Create a table called **Customer**table

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

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

TASK-4

Create a table called **branch** table.

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

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

TASK-5

Create a table called **sailor** table

Name	Type
Sid Number	Sname Varchar2(20)

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

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

TASK-6

Create a table called **reserves**table

Name	**Type**
Boat id	Integer
Sid	Integer
Day	Integer

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

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

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

- Create tables department and employee with required constraints.
- Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
- Basic column should not be null
- Add constraint that basic should not be less than 5000.
- Calculate hra,da,gross and net by using PL/SQL program.
- Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
- The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.The percentage of hra and da are to be stored separately.
- When the da becomes more than 100%, a message has to be generated and with user permissionda has to be merged with basic.
- Empno should be unique and has to be generated automatically.
- If the employee is going to retire in a particular month, automatically a message has to be generated.

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

TASK-8	**CURSORS**	

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

get a message 'None of the salaries were updated'. Else we get a message

TASK-9	PROCEDURES AND FUNCTIONS	

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

TASK-10	TRIGGERS	

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

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

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

Integer Not NULL, Sex Char, Address VARCHAR (50) Not NULL

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

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

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

TASK-11	CASE STUDY GENERAL HOSPITAL	

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required.

Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do thefollowing.

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

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

TASK-12	CASE STUDY: CAR RENTAL COMPANY	

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

study, do the following:

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

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

TASK-13	CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM	

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

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.

4. Create tables and generate Queries

4. Laboratory Equipment/Software/Tools Required

SQL

5. Books and Materials

Text Books

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30034 – GENDER SENSITIZATION

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

1. Course Description

Course Overview

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

Course Pre/corequisites

This course has no pre requisites

2. Course Outcomes (COs)

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

A30034.1	Develop a better understanding of important issues related to gender in contemporary India
A30034.2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
A30034.3	Acquire insight into the gendered division of labour and its relation to politics and economics
A30034.4	Equip to work and live together as equals
A30034.5	Develop a sense of appreciation of women in all walks of life

3. Course Syllabus

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. Sen, Amartya. "More thanone Million Women are Missing." New York ReviewofBooks 37,20(20 December1990).print

2. TripiLahiri, BytheNumbers: Where Indian Women Work, Women's Studies Journal(14November2012)<http://blogs.wsj.com/Indiareal time/2012/11/14/by-the-numberswhere-Indian-Women-work/>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROFESSIONAL ELECTIVE-1

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30251 – SPECIAL ELECTRICAL MACHINES

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

1. Course Description

Course Overview

The purpose of this course is to deal with the special machines used in control and industrial applications. This course covers principle, construction, operation and performance of single phase motor, switched reluctance motors, stepper motors, permanent magnet synchronous motors, linear motors and servo motors. These machines are specially designed for specific industrial purposes, electrical vehicles and wind energy conversion systems.

Course Pre/corequisites

1. A30205 - Electrical Circuits Analysis
2. A30206 - Electrical Machines-I
3. A30212 - Electrical Machines-II

2. Course Outcomes (COs)

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

A30251.1 Analyse the performance of single phase motors, switched reluctance motors, stepper motors, permanent magnet synchronous motor, linear motors and servo motors

A30251.2 Deduce the emf and torque equations of a single phase motors, stepper motor, switched reluctance motors, permanent magnet synchronous motor, servo motor, reluctance motor.

A30251.3 Apply speed control techniques for switched reluctance motors, stepper motors, Permanent magnet Synchronous Motor, linear motors and servo motors.

A30251.4 Plot the characteristics of single phase motors, switched reluctance motors, stepper motors, Permanent magnet Synchronous Motors, linear motors and servo motors.

3. Course Syllabus

UNIT-I

Single Phase Motors: Single phase induction motor – Constructional features, Double revolving field theory, Elementary idea of cross-field theory, split-phase motors, shaded pole motor, A.C. Series motors, Universal motors.

UNIT-II

Stepper Motor: Introduction, variable reluctance stepper motor, permanent magnet stepper motor, hybrid stepper motor, windings in stepper motors, and characteristics of stepper motor, open – loop control of stepper motor, closed – loop control of stepper motor and applications of stepper motor.

UNIT-III

Switched Reluctance Motors: Constructional features –Principle of operation- Torque prediction– Characteristics Steady state performance prediction – Analytical Method – Power controllers – Control of SRM drive- Sensor less operation of SRM – Applications..

UNIT-IV

Permanent Magnet Synchronous Motor: Construction, principle of operation, EMF equation, torque equation, comparison of conventional and PMSM, control of PMSM.

Synchronous Reluctance Motor (SRM)**:** principle**,** construction and working of SRM.

UNIT-V

Other Special Electrical Machines: Repulsion motor, hysteresis motor, single phase reluctance motor, linear induction motor.

Servo Motors: DC servo motors, AC servo motors.

4. Books and Materials

Text Book(s)

1. K.Venkataratnam,*Special electrical machines*, University press.
2. E.G.Janardhanan,*Special electrical machines*,PHI learning private limited,2014.

Reference Book(s)

1. S.K.Bhattacharya,*ElectricalMachines*, McGraw Hill education (India) Pvt. Ltd., 4th edition, 2014, 3rdreprint 2015.
2. AshfaqHussain, *Electrical Machines*, DhanpatRai& Co, 2ndedition, 2005
3. R.K.Rajput ,*Electrical Machines*, Laxmipublications,5thedition.2008

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30252 – ENERGY SOURCES

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different types of electrical power generations and its layouts, components and operating principles. The course also deals with the economic aspects of power generation and different tariff methods.This course also gives the emphasis about the wind energy, ocean energy, biomass and its economic aspects. In addition this course also focuses on the concepts of geothermal energy with other energy sources.The course also deals with the process of energy conversion of electrical power from conventional sources and non-conventional sources.

Course Pre/corequisites

1. A30004 - Applied Physics

2.Course Outcomes (COs)

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

A30252.1 Plot the layouts of different electrical power generating systems.

A30252.2 Analyzethe base load and peak load conditions to select suitable generating stations.

A30252.3 Comparedifferent types of tariffs suitable for different loads

A30252.4 Apply the principles of Renewable energy resources for the construction of Power generating station.

A30252.5 Categorize various energy conversion systems and their limitations.

3. Course Syllabus

UNIT-I

Thermal Power Generation: Block Diagram of Thermal Power Station (TPS) and its components.

Hydro Power - Selection of Site, Classification, Layout, Description of Main Components.

Nuclear Power -Principle of Operation of Nuclear Reactor and nuclear power station.Types of Nuclear Reactors and Brief Description of PWR, BWR and FBR.

UNIT-II

Economic Aspects of Power Generation:

Load Curve, Load Duration and Integrated Load Duration Curves-Load Demand, Diversity, Capacity, Utilization and Plant Use Factors, Numerical Problems.Costs of Generation and their division into Fixed, Semi-Fixed and Running Costs.

Tariff Methods - Desirable Characteristics of a Tariff Method, Flat Rate, Block-Rate, Two-Part, Three – Part, and Power Factor Tariff Methods.

UNIT-III

Solar Power Generation: Role and Potential of Solar Energy Options, Principles of Solar Radiation, Flat Plate and Concentrating Solar Energy Collectors, Different Methods of Energy Storage, PV Cell- V-I Characteristics.

Wind Power Generation: Role and potential of Wind Energy Option, Horizontal and Vertical Axis Wind Mills, Performance Characteristics- Power- Speed & Torque- Speed Characteristics, Pitch & Yaw Controls, Economic Aspects.

UNIT-IV

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

Tidal and Wave Energy: Mini-hydel power plants, and their economics.

UNIT-V

Direct Energy Conversion: Need for DEC, limitations, principles of DEC and different types of Energy Conversions

Magneto Hydro Dynamics (MHD): Principle of working of MHD Power plant, performance and limitations.

Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

4. Books and Materials

Text Book(s)

1. M.L. Soni, P.V. Gupta, U.S. Bhatnagar, A. Chakrabarti, *A Text Book on Power System Engineering*, DhanpatRai& Co Pvt. Ltd., 2003.

2. G.D.Rai, *Non-Conventional Energy Sources*, fourth edition (2009), Khanna Publishers, New Delhi.

Reference Book(s)

1.C.L.Wadhwa, *Electrical Power Systems*, New Age International (P) Limited, 6th Edition, 2010.

2.V.K. Mehta and Rohit Mehta, *Principles of Power Systems*, 4th Revised Edition, S.Chand& COMPANY LTD., Reprint 2010.

3.Twidell& Weir, *Renewable Energy Sources*, fourth Edition (2009), Tata McGraw Hill Education Private Limited, New Delhi.

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COURSE STRUCTURE

A30253 – ADVANCED CONTROL THEORY

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the application of control theory. This course mainly discusses the physical systems using mathematical modelling, controllability &observability of the system, state feedback controllers and observers of the system. Here in this course the nonlinear systems behaviour and its stability analysis are discussed. These concepts mainly used in optimal-tuning nonlinear PID control of hydraulic systems and the neural predictive control of combustor acoustic of gas turbines.

Course Pre/corequisites

1. A30213 -Control Systems
2. A30010 -Mathematics-II

2. Course Outcomes (COs)

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

A30253.1 Develop the mathematical model of linear/non-linear systems in state space.

A30253.2 Investigate the controllability/observability of a given system.

A30253.3 Analyze stability of linear / Non-linear systems using various methods.

A30253.4 Design state feedback controller and optimal controller for a given system.

A30253.5Evaluate the stability of the given system by Lyapunov criterion.

3. Course Syllabus

UNIT-I

Mathematical Preliminaries: Vectors & vector spaces, linear combinations and bases, linear transformations and matrices, scalar product and norms, Eigen values, Eigen vectors and a canonical form representation of linear operators.

UNIT-II

Controllability and Observability: Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability of state models in Jordan canonical form. Effect of state feedback on controllability and observability.

UNIT-III

State Feedback Controllers and Observers: Design of State Feedback Controllers through Pole placement, Full-order observer and reduced-order observer. State estimation through Kalman Filters.

UNIT-IV

Analysis of Nonlinear Systems: Introduction to nonlinear systems, Types of nonlinearities, Concept of describing functions, Derivation of describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis Jump Resonance. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase plane analysis of nonlinear control systems.

UNIT-V

Stability Analysis: Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for Linear and Nonlinear continuous time autonomous systems.

4. Books and Materials

Text Book(s)

1. K. Ogata (2011), *Modern Control Engineering*, Prentice Hall, 5th Edition, 2010.
2. M. Gopal,*Modern Control System Theory,* New Age International Publishers, Revised 2nd edition, 2005.

Reference Book(s)

1. I.J.Nagarath and M.Gopal, *Control Systems Engineering*, New Age InternationalPublishers, 5th Edition, 2007, Reprint 2012.
2. D.RoyChoudhury, *Modern Control Engineering,*PHI Learning Private Limited, 9thPrinting, January 2015.
3. A.Nagoorkani,*Advanced Control Theory,* CBS Publishers &DistributorsPvt.Ltd, 3rdEdition, 2017.

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PROFESSIONAL ELECTIVE-2

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30254-HYBRID ELECTRIC VEHICLES

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the importance of hybrid electric vehicles. This course introduces the fundamental concepts, principles, analysis and design of hybrid electric vehicles. Here various types of energy storage devices along with energy management' strategies are discussed. The concepts of hybrid electric train and energy efficiency analysis of electric trains are discussed. The concepts studied in this course help the students in designing hybrid electric vehicles.

Course Pre/corequisites

1. A30206 - Electrical Machines-I
2. A30212 - Electrical Machines-II
3. A30218 - Power Electronics

2. Course Outcomes (COs)

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

A30254.1 Analyze the topologies used for design of hybrid electric vehicles.

A30254.2 Apply the concepts of power electronics & drives to control hybrid electric vehicles.

A30254.3 Analyze power flow control and various energy storage components used for hybrid electric vehicles.

A30254.4 Demonstrate different configurations, techniques and sizing of components used in hybrid electric vehicles.

3. Course Syllabus

UNIT-I

Introduction: Hybrid Electric Vehicle- Comparison with Conventional Vehicles, History of electric vehicles, social and environmental importance of hybrid and electric vehicles. Vehicle Power Plant and Transmission Characteristicsand mathematical models to describe vehicle performance.Energy Use in Conventional Vehicles and Energy Savings Potential of Hybrid Drivetrains.

UNIT-II

Hybrid Electric Drive-Trains: Basic concept of hybrid traction, introduction to various hybrid drivetraintopologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis-pre-transmission and post-transmission.

UNIT-III

Design of Hybrid and Electric Vehicles: Definition of hybridness, Hybrid design philosophy,Hybridness: parallel hybrid, series, mixed and range extender (plug-in) hybrids, Range extender, Optimization and hybridness, Battery power and electric motor power.

UNIT-IV

Control System for Electric and Hybrid Electric Vehicles: Function of Control System in HEVs and EVs, Elementary of Control Theory, Overview of Control System: The Electronic Control Unit (ECU)
Control Area Network, Control Variables

UNIT-V

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Hybridization of different energy storage devices, energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies.

4. Books and Materials

Text Book(s)

1. C. Mi, M. A. Masrur and D. W. Gao, *Hybrid Electric Vehicles*: *Principles and Applications with Practical Perspectives*, John Wiley &sons, 2011.
2. S. Onori, L. Serrao and G. Rizzoni, *Hybrid Electric Vehicles*: *Energy Management Strategies*, Springer, 2015.

Reference Book(s)

1. A. E. Fuhs, *Hybrid Vehicles and the Future of Personal Transportation*, CRC Press, 2009
2. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, *Modern Electric, Hybrid Electric, and Fuel CellVehicles*: Fundamentals, Theory, and Design, CRC press, 2004.
3. 2. IqbalHussain, *Electric & Hybrid Vehicles – Design Fundamentals*, Second Edition, CRC press, 2011.

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

1. Course Description

Course Overview

The purpose of this course is to enable the students to acquire knowledge of design of smart grid and control and its applications. The objective of this course is to make the students understand the emergency of converting the conventional grids to smart grid. Here in this course the Architecture, Tools, Techniques and Communication Technologies for Smart Grid are discussed. Here the concepts of Load Frequency Control in Micro Grid System and Reactive Power Control in Smart Grid are explained.

Course Pre/corequisites

1. A30217- Electrical Power Transmission and Distribution
2. A30219 - Electrical Measurements & Instrumentation

2. Course Outcomes (COs)

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

A30255.1	Demonstrate the need of converting conventional grid to Smart Grid.
A30255.2	Assess the role of automation in Transmission and Distribution.
A30255.3	Apply Evolutionary Algorithms for the Smart Grid.
A30255.4	Analyse various Methods used for information security on smart grid
A30255.5	Analyse Voltage and Frequency control techniques in Micro Grids.

3. Course Syllabus

UNIT-I

Introduction to Smart Grid: Introduction tosmart grid - working definitions of smart grid and associated concepts – smart grid functions – traditional power grid and smart grid – new technologies for smart grid – advantages – Indian smart grid – key challenges for smart grid.

UNIT-II

Smart Grid Architecture: Components and architecture of smart grid design – review of the proposed architectures for smart grid. the fundamental components of smart grid designs – transmission automation – distribution automation – renewable integration

UNIT-III

Tools and Techniques for Smart Grid: Computational techniques – static and dynamic optimization techniques – computational intelligence techniques – evolutionary algorithms – artificial intelligence techniques.

UNIT-IV

Communication Technologies and Smart Grid: Introduction to communication technology – synchro-phasor measurement units (PMUS) – wide area measurement systems (WAMS)- introduction to internet of things (IOT)- applications of iot in smart grid

UNIT-V

Control of Smart Power Grid System: Load frequency control (LFC) in micro grid system – voltage control in micro grid system – reactive power control in smart grid. case studies andtest beds for the smart grids.

4. Books and Materials

Text Book(s)

1. JanakaEkanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, *Smart Grid,* Wiley publications, 2012, reprint 2015.
2. James Momoh, Wiley, *Smart Grid: Fundamentals of Design and Analysis*, IEEE press., 2012,reprint 2016.

Reference Book(s)

1. Clark W.Gellings, *The Smart Grid – Enabling Energy efficiency and demand response,* CRC Press, Taylor & Francis group, first indian reprint. 2015.
2. Lars Torsten Berger, Krzysztof Iniewski, *Smart Grid – Applications, Communications, and Security,* Wiley, 2012, reprint 2015.
3. Cobus Strauss, *Practical Electrical Network Automation and Communication Systems,*Elsvier, 2003.

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the application of control systems. The objective of this course is to design and analysis of digital control systems. The students will gain familiarity with sampling, quantization and z-transforms used to analyze and design digital control systems. Also the concepts of, state space analysis and stability analysis in digital domain are explained. Digital control systems techniques are mainly used in Radar, Economic Systems and Biological Systems etc.

Course Pre/corequisites

1. A30213 -Control Systems
2. A30010 -Mathematics-II

2. Course Outcomes (COs)

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

A30256.1 Apply the Sampling and reconstruction theory in A/ D &D/A Conversion.

A30256.2 Solve the given differential equations using Z- transforms.

A30256.3 Analyse the given discrete time system in frequency domain and Z domain.

A30256.4 Design a given discrete time system in Z – Plane and state space representation.

A30256.5 Investigate the Stability of the closed loop systems using Z- transforms.

3. Course Syllabus

UNIT-I

Sampling and Reconstruction: Introduction, Examples of Data control systems, Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

UNIT-II

Z – Transforms: Introduction, Linear difference equations, pulse response, Z - transforms, Theorems of Z - Transforms, the inverse Z - transforms, Modified Z – Transforms.

UNIT-III

Z - Plane Analysis of Discrete - Time Control System: Z - Transform method for solving difference equations, Pulse transforms function, block diagram analysis of sampled data systems, mapping between S - plane and Z - plane.

UNIT-IV

State Space Analysis: State Space Representation of discrete time systems, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations.

UNIT-V

Stability Analysis: Mapping between the S - Plane and Z – Plane, Primary strips and Complementary Strips, Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z - Plane. Jury stability test, Stability Analysis by Bilinear Transformation and Routh Stability criterion.

4. Books and Materials

Text Book(s)

1. K. Ogata (2011),*Discrete-Time Control systems*, 2nd edition, Pearson Education / Prentice Hall of India, New Delhi.
2. Kuo (2003), *Digital Control Systems,* 2nd edition, Oxford University Press, New Delhi.

Reference Book(s)

1. J. Nagrath, M. Gopal (2011), *Control Systems Engineering*, 5th edition, New Age International (P) Ltd, New Delhi.
2. M. Gopal (2009), *Digital Control and State Variable Method*, 3rd edition, Tata McGraw-Hill Companies, New Delhi.
3. N. K. Sinha (2008), *Control Systems*, 3rd edition, New Age International Limited Publishers, New Delhi.