G.Pullaiah College of Engineering and Technology
(Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA (CSE, ECE & EEE) | Permanently Affiliated to JNTUA) Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS
GPCET - R18

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

Preliminary Definitions and Nomenclature

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Regulations: The regulations, common to all B.Tech programs offered by Institute, are designated as "GPCET Regulations - R18" and are binding on all the stakeholders.

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

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

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

University: Means Jawaharlal Nehru Technological University 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 2018-19
&
For B.Tech Lateral Entry batches admitted from the academic year 2019 - 2020

1. Award of B.Tech. Degree

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

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

ii. Registers for 176 credits and secures all 176 credits.

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

3. Courses of study

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

S.No.	Name of the Branch	Branch Code
1.	Civil Engineering	01
2.	Electrical and Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science and Engineering	05

4. Credits:

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

	Semester	
	Periods / Week	Credits
Theory	03	03
Practical	04	02
Mini Project/Internship	04	02
Technical Seminar	04	02
Project Work	04/16	02/08

5. Distribution and Weightage of Marks

5.1 The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, Technical Seminar will be evaluated for 100

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

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

5.2. Internal Examinations:

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

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

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

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

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

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

5.3. End Examinations:

End examination of theory subjects shall have the following pattern:

There shall be 6 questions and all questions are compulsory. Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them. Each of these questions from 2 to 6 shall cover one unit of the syllabus.

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

Question paper shall be in two parts viz., Part A and Part B with equal Weightage. In each part, there shall be 3 either-or type questions for 12, 12 and 11 marks.

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

5.4. For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the laboratory shall be evaluated for 30 marks by the concerned laboratory teacher based on the regularity/record/ viva. The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.

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

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

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

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

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

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

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

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

5.10 **Minor in a discipline** (Minor degree/programme) concept is introduced in the curriculum for all conventional B. Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects and a minor discipline project.

a. Students who have a CGPA 8.5 (for SC/ST students CGPA 8.0) or above (up to II year-I semester) and without any backlog subjects will be permitted to register for Minor discipline programme. An SGPA

and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration active else Minor discipline registration will be cancelled.

b. Students aspiring for a Minor must register from **third** year **first** semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor discipline registrations are not allowed in the **Fourth** year.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Procedure for Conduct and Evaluation of Project II:

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

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

6. Attendance Requirements:

- A student shall be eligible to appear for University examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester when offered next.

7. Minimum Academic Requirements:

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

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

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

One regular and one supplementary examinations of I year (I & II Semesters).

One regular examination of II year I semester

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

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

And in case if student is detained for want of credits for particular academic year by sections 7.2 and 7.3 above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the III Year or IV Year as the case may be.

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

7.5 Students who fail to earn 176 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

8. Course Pattern:

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

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

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

8.3 **With–holding of Results**:

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

8.4 **Grading**

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

Table – Conversion into Grades and Grade Points assigned

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

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

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

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

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

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

where, C_i is the number of credits of the i^{th} subject and GP_i is the grade point scored by the student in the i^{th} course.

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

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

where "$SGPA_j$" is the SGPA of the j^{th} semester and TC_j is the total number of credits in that semester.

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

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

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

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

10. Award of Class:

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

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

11. Gap Year:

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

12. Transitory Regulations:

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

Candidates who were permitted with Gap Year shall be eligible for 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 rejoining.

13. Minimum Instruction Days:

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

14. Medium of Instruction

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

15. Rules of Discipline

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

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

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

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

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

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

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

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

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

(x) Dress Code

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

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

16. Punishments for Malpractice cases – Guidelines

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

S.No.	**Nature of Malpractice/Improper conduct**	**Punishment**
1	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the course of the examination).	Expulsion from the examination hall and cancellation of the performance in that course only.
2	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
3	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
4	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. In case of an outsider, he will be handed over to the police and a case shall be registered against him.
5	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
6	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeit of seat.
8	Refuses to obey the orders of the Chief	In case of students of the college, they

	Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	shall be expelled from examination halls and cancellation of their performance in that course and all other courses of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case shall be registered against them.
9	Leaves the exam hall taking away answer script or intentionally tears up the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
10	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in S.No7 to S.No 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case shall be registered against them.
12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case shall be registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination including practicals and project work of that semester/year. The student is rusticated from the college for two consecutive years during which period

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

ACADEMIC REGULATIONS FOR B. TECH.(R15)
(LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2019-2020 and onwards)

1. Award of B.Tech. Degree

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

a) Pursues a course of study for not less than three academic years and in not more than six academic years.

b) Registers for *134* credits and secures all *134* credits from II to IV year of Regular B. Tech. program.

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

(b) The regulations **3** to **6** are to be adopted as that of B. Tech. (Regular).

2. Minimum Academic Requirements:

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

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

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

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

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

3. Course Pattern

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

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

5. Award of Class:

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

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

6. The regulations **11** to **16** are to be adopted as that of B. Tech. (Regular). All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

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G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

(An Autonomous Institute affiliated to JNTUA, Ananthapuramu)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAMMECURRICULUM STRUCTURE UNDER R18 REGULATIONS

I SEMESTER (I YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1001	Functional English	HS	3	0	0	3	30	70	100
A1002	Mathematics – I	BS	3	0	0	3	30	70	100
A1501	Computer Programming	ES	3	0	0	3	30	70	100
A1003	Engineering Physics	BS	3	0	0	3	30	70	100
A1301	Engineering Drawing	ES	0	0	6	3	30	70	100
A1006	English Language Communication Skills Laboratory	HS	0	0	4	2	30	70	100
A1007	Engineering Physics Laboratory	BS	0	0	4	2	30	70	100
A1502	Computer Programming Laboratory	ES	0	0	4	2	30	70	100
	TOTAL		12	00	18	21	240	560	800

II SEMESTER (I YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1009	Mathematics – II	BS	3	0	0	3	30	70	100
A1008	English for Professional Communication	HS	3	0	0	3	30	70	100
A1004	Engineering Chemistry	BS	3	0	0	3	30	70	100
A1005	Environmental Studies	BS	3	0	0	3	30	70	100
A1203	Electrical Circuits – I	ES	3	0	0	3	30	70	100
A1010	Engineering Chemistry Laboratory	BS	0	0	4	2	30	70	100
A1204	Electrical Circuits Laboratory	ES	0	0	4	2	30	70	100
A1302	Engineering and IT Workshop	ES	0	0	4	2	30	70	100
	TOTAL		15	00	12	21	240	560	800

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PROGRAMMECURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH –ELECTRICAL AND ELECTRONICS ENGINEERING

III SEMESTER (II YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1014	Linear Algebra and Complex Variables	BS	3	1	0	4	30	70	100
A1205	Electrical Machines – I	PC	3	1	0	4	30	70	100
A1206	Electro Magnetic Fields	PC	4	0	0	4	30	70	100
A1207	Electrical Circuits – II	PC	3	1	0	4	30	70	100
A1401	Electronic Devices and Circuits	ES	3	0	0	3	30	70	100
A1208	Electrical Machines – I Laboratory	PC	0	0	3	1.5	30	70	100
A1209	Electrical Circuits and Simulation Laboratory	PC	0	0	3	1.5	30	70	100
A1405	Electronic Devices and Circuits Laboratory	ES	0	0	2	1	30	70	100
A1013	Verbal Ability and Logical Reasoning	HS	1	0	0	1	30	70	100
	TOTAL		17	03	08	24	270	630	900

IV SEMESTER (II YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1210	Electrical Machines – II	PC	3	1	0	4	30	70	100
A1211	Control Systems	PC	3	1	0	4	30	70	100
A1212	Power Systems-I	PC	4	0	0	4	30	70	100
A1414	Linear and Digital Integrated Circuit Applications	ES	3	0	0	3	30	70	100
A1701	Managerial Economics & Financial Analysis	HS	3	0	0	3	30	70	100
A1213	Control Systems Laboratory	PC	0	0	3	1.5	30	70	100
A1214	Electrical Machines – II Laboratory	PC	0	0	3	1.5	30	70	100
A1415	Linear and Digital Integrated Circuit Applications Laboratory	ES	0	0	2	1	30	70	100
A1012	Quantitative Aptitude	BS	1	0	0	1	30	70	100
A1215	Comprehensive Online	PC	0	0	0	1	-	100	100

	Examination-I								
		TOTAL	**17**	**02**	**08**	**24**	**270**	**730**	**1000**

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PROGRAMMECURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRICALAND ELECTRONICS ENGINEERING

V SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1218	Power Systems-II	PC	3	1	0	4	30	70	100
A1219	Power Electronics	PC	3	1	0	4	30	70	100
A1220	Electrical Measurements and Instrumentation	PC	3	0	0	3	30	70	100
A1424	Digital Electronics	PC	3	0	0	3	30	70	100
	Professional Elective – 1	PE	3	0	0	3	30	70	100
	Open Elective – 1	OE	3	0	0	3	30	70	100
A1221	Power Electronics Laboratory	PC	0	0	3	1.5	30	70	100
A1222	Electrical Measurements and Instrumentation Laboratory	PC	0	0	3	1.5	30	70	100
A1016	Advanced English Language Communication Skills	MC	2	0	0	0	100*	-	100*
	TOTAL		20	02	06	23	240	560	800

VI SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1223	Power Semiconductor Drives	PC	3	0	0	3	30	70	100
A1224	Power System Analysis	PC	3	1	0	4	30	70	100
A1427	Microprocessors and Microcontrollers	PC	4	0	0	4	30	70	100
	Professional Elective – 2	PE	3	0	0	3	30	70	100
	Professional Elective – 3	PE	3	0	0	3	30	70	100
A1225	Power Systems Simulation Laboratory	PC	0	0	3	1.5	30	70	100
A1429	Microprocessors and Microcontrollers Laboratory	PC	0	0	3	1.5	30	70	100
A1529	Python Programming Laboratory	PC	0	0	4	2	30	70	100
A1226	Comprehensive Online Examination-II	PC	0	0	0	1	-	100	100
A1015	Human Values and Professional Ethics	MC	2	0	0	0	100*	-	100*
	TOTAL		18	01	10	23	240	660	900

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

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PROGRAMMECURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRICALAND ELECTRONICS ENGINEERING

VII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1227	Power System Protection	PC	3	0	0	3	30	70	100
A1228	Neural Networks and Fuzzy Logic	PC	3	0	0	3	30	70	100
A1229	Power System Operation and Control	PC	3	0	0	3	30	70	100
	Professional Elective – 4	PE	3	0	0	3	30	70	100
	Open Elective – 2	OE	3	0	0	3	30	70	100
A1230	Power System Laboratory	PC	0	0	2	1	30	70	100
A1539	JAVA Programming Laboratory	PC	0	0	4	2	30	70	100
A1231	Industrial IoT Laboratory	PC	0	0	4	2	30	70	100
A1232	Mini Project /Internship	PW	0	0	4	2	100	-	100
A1233	Project Work Phase-I	PW	0	0	4	2	100	-	100
	TOTAL		15	00	18	24	440	560	1000

VIII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	Professional Elective – 5	PE	3	0	0	3	30	70	100
	Open Elective – 3	OE	3	0	0	3	30	70	100
A1234	Technical Seminar	PW	0	0	4	2	100	-	100
A1235	Project Work Phase-II	PW	0	0	16	8	60	140	200
	TOTAL		06	00	20	16	220	280	500

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

Professional Electives:

Professional Elective – 1	
Course Code	**Title of the Course**
A1251	Special Electrical Machines
A1252	Utilization of Electrical Energy
A1253	Advanced Control Theory
A1254	Solar Energy and its Applications

Professional Elective – 2	
Course Code	**Title of the Course**
A1255	Hybrid Electric Vehicles
A1256	Electrical Distribution and Automation
A1257	Fundamentals of Signals and Systems
A1258	Wind Energy and its Applications

Professional Elective – 3	
Course Code	**Title of the Course**
A1259	Machine Modeling and Analysis
A1260	High Voltage Engineering
A1261	Digital Control Systems
A1262	Smart Grid Technology

Professional Elective – 4	
Course Code	**Title of the Course**
A1263	Switched Mode Power Converters
A1264	EHVAC Transmission
A1265	Digital Signal Processing
A1266	Reliability Engineering in Renewable Energy Sources

Professional Elective – 5/MOOCs	
Course Code	**Title of the Course**
A1267	Introduction to Battery Management
A1268	HVDC Transmission
A1269	Industrial Automation and Control
A1270	AI Techniques in Power Systems

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PROGRAMMECURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

Open Electives:

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

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

Course Structure for B.Tech. - R18 Regulations
ELECTRICAL & ELECTRONICS ENGINEERING

I B.Tech. -I Semester

S.No	Course code	Subject	Theory	Tu / Drg / Lab	Credits
1.	A1001	Functional English	3	1 - -	3
2.	A1002	Mathematics – I	3	1 - -	3
3.	A1501	Computer Programming	3	1 - -	3
4.	A1003	Engineering Physics	3	1 - -	3
5.	A1301	Engineering Drawing	0	- 6 -	3
6.	A1006	English Language Communication Skills Lab	-	- - 4	2
7.	A1007	Engineering Physics Lab	-	- - 4	2
8.	A1502	Computer Programming Lab	-	- - 4	2
					21

I B.Tech. I - Semester | **T** | **Tu** | **C**
3 | **1** | **3**

(A1001) FUNCTIONAL ENGLISH
(Common to All Branches)

Preamble:

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

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

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

Objectives:

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

UNIT –I

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

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

UNIT –II

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

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

UNIT –III

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

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

UNIT –IV

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

Text: SPACE TREK from *MINDSCAPES*

Hubble Telescope - Chandrayan-2 - Anusat - Living Quarters - Space Tourism

UNIT –V

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

Text: MEDIA MATTERS from *MINDSCAPES*

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

Text Books:

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

References:

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

Outcomes:

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

I B.Tech. - I Semester

T	Tu	C
3	1	3

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

Objectives:

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

UNIT – I

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

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

UNIT – II

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

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

UNIT – III

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

Radius of curvature.

UNIT – IV

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

UNIT – V

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

Text Books:

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

References:

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

Outcomes:

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

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

I B.Tech. I - Semester

T	Tu	C
3	1	3

(A1501) COMPUTER PROGRAMMING
(Common to All Branches)

Objectives:

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

UNIT - I

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

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

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

Text Books:

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

References:

1. Programming in C, Second Edition – Pradip Dey, Manas Ghosh, Oxford University Press.
2. “C From Theory to Practice”- George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
3. “Programming with C”- R S Bichkar- University Press.

4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education. (UNIT-I)
5. Computer Fundamentals and C Programming- Second Edition- P.Chenna Reddy- Available at Pothi.com (http://pothi.com/pothi/book/dr-p-chenna-reddy-computer-fundamentals-and-c-programming).

Outcomes:

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

I B.Tech. I - Semester

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(A1003) ENGINEERING PHYSICS
(Common to CSE/EEE/CIVIL)

Objectives:

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

UNIT - I
PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics: Interference (Review) – Interference in thin film by reflection –Newton‟s rings – Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating. *Lasers:* Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein‟s coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

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

UNIT – II
CRYSTALLOGRAPHY AND ULTRASONICS

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

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

UNIT – III
QUANTUM MECHANICS AND ELECTRON THEORY

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

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

UNIT – IV
SEMICONDUCTORS AND MAGNETIC MATERIALS

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

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

UNIT – V
SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

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

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

Text Books:

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

References:

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

Outcomes:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting and magnetic materials are illustrated.

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

B.Tech. I - I Sem. **Th Drg C**
0 6 3

(A1301) ENGINEERING DRAWING
(Common to CSE/EEE/CIVIL)

Objectives:

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

UNIT I

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

UNIT II

Scales: Plain, Diagonal and Vernier;

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

UNIT III

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

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

UNIT IV

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

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

UNIT V

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

***Text Books**:*

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

***References**:*

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

Outcomes:

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

- Drafting projections of points, planes and solids.

I B.Tech. I - Semester **P C**
4 2

(A1006) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB (Common to All Branches)

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

Objectives:

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

UNIT - 1

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

UNIT - II

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

UNIT - III

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

UNIT - IV

13. Debates
14. Group Discussions
15. Interview skills

UNIT - V

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

Minimum Requirements for ELCS Lab:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A.

system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):

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

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

ii) Headphones of High quality

Suggested Software:

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

References:

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

Outcomes:

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

I B.Tech. I - Semester **p C**
4 2

(A1007) ENGINEERING PHYSICS LABORATORY
(Common to CSE/EEE/CIVIL)

Objectives:

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

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

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

References:

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

Outcomes:

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

study of their relative parameters.

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

I B.Tech. I - Semester **P C**
4 2

(A1502) COMPUTER PROGRAMMING LAB
(Common to All branches)

Objectives:

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

List of Experiments/Tasks

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

complex numbers.

22. Write a program to split a „file‟ in to two files, say file1 and file2. Read lines into the „file‟ from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange‟s interpolation, Trapezoidal rule.
25. Write a program to read a set of strings and sort them in alphabetical order.
26. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    i. String length determination ii .Compare Two Strings
    iii. Concatenate them, if they are not equal iv. String reversing
27. Write programs using recursion for finding Factorial of a number, GCD, LCM, and solving Towers of Hanoi problem.
28. Write a program to exchange two numbers using pointers.
29. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
30. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
31. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
32. Write a program to find the square root of a number without using built-in library function.
33. Write a program to convert from string to number.
34. Write a program to implement pseudo random generator.
35. Write a program to generate multiplication tables from 11 to 20.
36. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
37. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
38. Write a program to find the execution time of a program.
39. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

Note:

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

References:

1. “How to Solve it by Computer”, R.G. Dromey, Pearson.
2. “The C Programming Language”, Brian W. Kernighan, Dennis M. Ritchie, Pearson.

3. "Let us C", Yeswant Kanetkar, BPB publications
4. "Pointers in C", Yeswant Kanetkar, BPB publications.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education.

Outcomes:

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

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

I-II Semester

S.No	Course code	Subject	Th	Tu/Drg/Lab	Credits
1.	A1009	Mathematics – II	3	1 - -	3
2.	A1008	English for Professional Communication	3	1 - -	3
3.	A1004	Engineering Chemistry	3	1 - -	3
4.	A1005	Environmental Studies	3	1 - -	3
5.	A1203	Electrical Circuits – I	3	1 - -	3
6.	A1010	Engineering Chemistry Lab	-	- - 4	2
7.	A1204	Electrical Circuits Lab	-	- - 4	2
8.	A1302	Engineering & IT Workshop	-	- - 4	2
					21

B.Tech. I - II Sem. (EEE) **T Tu C**
3 1 3

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

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

UNIT – I

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

UNIT – II

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

UNIT – III

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

UNIT – IV

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

UNIT – V

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

TEXT BOOKS:

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

REFERENCES:

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

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

B.Tech. I - II Sem. (EEE) **T Tu C**
3 1 3

(A1008) ENGLISH FOR PROFESSIONAL COMMUNICATION

1. INTRODUCTION:

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

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

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

2. OBJECTIVES:

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

3. SYLLABUS:

UNIT –I

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

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

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

UNIT-II

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

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

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

UNIT-III

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

Text: 'ENGINEERING ETHICS' from ***MINDSCAPES***
Challenger Disaster - Biotechnology - Genetic Engineering - Protection From Natural Calamities
UNIT-IV
Topics: Vocabulary, Conversation, Collocation, Group discussion, Note-making, Clauses, Interpreting charts and tables , Report writing.

Text: 'TRAVEL AND TOURISM' from ***MINDSCAPES***
Advantages and Disadvantages of Travel - Tourism - Atithi Devo Bhava - Tourism in India
UNIT-V
Topics: Vocabulary, phrasal verbs, writing a profile, connectives, discourse markers, problem-solving, telephone skills, application letters, curriculum vitae, interviews (telephone and personal)
Text: 'GETTING JOB-READY' from ***MINDSCAPES***
SWOT Analysis - Companies And Ways Of Powering Growth - Preparing For Interviews
Prescribed Text
MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.
REFERENCES:
1**. Effective Tech Communication,** Rizvi,Tata McGraw-Hil Education, 2007.

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

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

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

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

B.Tech. I - II Sem. (EEE) **T Tu C**
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(A1004) ENGINEERING CHEMISTRY
(Common to All Branches)

Objectives:

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

UNIT – I WATER QUALITY AND TREATMENT

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

Industrial Use of water:

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

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

UNIT – II POLYMERS

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

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

Elastomers

Natural Rubber; Processsing of natural rubbers, Compounding of Rubber

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

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

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

UNIT – III ELECTROCHEMISTRY

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

ii) Corrosion: Introduction, type of corrosion (Concentration cell corrosion, Galvanic corrosion), Chemical (Dry) and Electrochemical (Wet) Theory of corrosion. Galvanic series, factors affecting the corrosion (Metal and environment). Prevention: Cathodic protection (Sacrificial anode and impressed current), Inhibitors (Anodic and cathodic), electroplating (Copper, nickel and chromium) and electroless plating (Copper and nickel)

UNIT – IV FUELS AND COMBUSTION

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

Solid Fuels: Coal-Classification and Analysis (proximate and ultimate), Coke :Characteristics of metallurgical coke, Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline- Octane Number, Diesel -Cetane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

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

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

UNIT – V CHEMISTRY OF ENGINEERING MATERIALS

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

ii) Refractories: Introduction, Classification , properties and applications

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

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

Text Books:

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

References:

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

Outcomes: The student is expected to:

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

B.Tech. I - II Sem. (EEE) **T Tu C**
3 1 3

(A1005) ENVIRONMENTAL STUDIES

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

UNIT – I

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

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

UNIT – II

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

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

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

wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

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

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

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

UNIT – IV

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

UNIT – V

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

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

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Pubilishers.

REFERENCES :

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

Outcomes :

(1) Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.

(2) Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.

(3) Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.

(4) By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.

At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.

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

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(A1203) ELECTRICAL CIRCUITS - I

Objectives:

To make the student learn about

- Basic characteristics of R,L,C parameters
- The concepts of real power, reactive power, complex power, phase angle and phase difference
- How to compute two port network parameters
- Network reduction techniques, star to delta and delta to star transformations
- Series and parallel resonances, bandwidth, current locus diagrams
- Network theorems and their applications

UNIT- I INTRODUCTION TO ELECTRICAL & MAGNETIC CIRCUITS

Electrical Circuits: Circuit Concept, R, L and C Parameters - Independent and Dependent Voltage and Current Sources -Source Transformation, Voltage - Current Relationship for Passive Elements (For Different Input Signals: Square, Ramp, Saw Tooth, Triangular. Kirchhoff's Laws, Network Reduction Techniques: Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction, Concept of Self and Mutual Inductance, Dot Convention, Coefficient of Coupling, Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations.

UNIT- II SINGLE PHASE A.C CIRCUITS

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms: Sinusoidal Alternating Quantities. Phase and Phase Difference, Complex and Polar Forms Of Representations, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) With Sinusoidal Excitation, Concept of Power Factor, Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power and Complex Power. Examples.

UNIT- III 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.

UNIT- IV 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- V 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.

Outcome:

After completing the course, the student should be able to do the following:

- Given a network, find the equivalent impedance by using network reduction techniques
- Given a circuit and the excitation, determine the real power, reactive power, power factor etc,.
- Determine the current through any element and voltage across any element
- Apply the network theorems suitably

TEXT BOOKS:

1. Electrical Circuit Theory and Technology 4th Edition, John Bird, Rovtledge/T&F, 2011.
2. Network Analysis 3rd Edition, M.E Van Valkenberg, PHI.

REFERENCES:

1. Circuit Theory (Analysis & Synthesis) 6th Edition, A. Chakrabarti, Dhanpat Rai & Sons, 2008.
2. Electric Circuits by N.Sreenivasulu, REEM Publications
3. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
4. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill

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

(A1010) ENGINEERING CHEMISTRY LAB
(Common to All Branches)

Objectives:

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

List of Experiments:

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

(Any 10 experiments from the above list)

References:

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

Outcomes:

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

B.Tech. I - II Sem. (EEE) **P** **C**
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(A1204) ELECTRICAL CIRCUITS LAB

OBJECTIVES:

To make the student learn about:

- Experimental verification of theorems
- Experimental verification of Resonance phenomenon
- Drawing current locus diagrams
- Practical determination of two port network parameters
- Practical implementation of active and reactive power measurement techniques

List of Experiments:

1) Verification of Thevenin's and Norton's Theorems
2) Verification of Superposition Theorem and Maximum Power Transfer Theorem
3) Verification of Compensation Theorem
4) Verification of Reciprocity , Millmann's Theorems
5) Locus Diagrams of RL and RC Series Circuits
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of Coupling
8) Z and Y Parameters
9) Transmission and Hybrid Parameters
10) Measurement of Active Power for Star and Delta Connected Balanced Loads
11) Measurement of Reactive Power for Star and Delta Connected Balanced Loads
12) Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

OUTCOMES:

After completing the course, the student should be able to do the following:

- Apply suitable theorems for circuit analysis and verify the results theoretically
- Experimental determination of two port network parameters and theoretical verification
- Measure active and reactive power experimentally and verify the theoretical values
- Experimentally determine self inductance, mutual inductance and coefficient of coupling
- Practically determine band width, Q-factor and verify with theoretical values.

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

(A1302) ENGINEERING & I.T. WORKSHOP

ENGINEERING WORKSHOP

Course Objective:

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

1. TRADES FOR EXERCISES:

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

2. TRADES FOR DEMONSTRATION:

a. Plumbing
b. Machine Shop
c. Metal Cutting

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

References:

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

I.T. WORKSHOP

Course Objective:

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

Learning Outcome:

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

Preparing your Computer (5 weeks)

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

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

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

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

Networking and Internet (4 weeks)

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

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

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are

expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

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

Productivity tools (6 weeks)

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

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

Task 10: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

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

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter

- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

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

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

References:

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

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(AUTONOMOUS)

Course Structure for B.Tech - R18 Regulations
ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech-III SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1014**	Linear Algebra and Complex Variables	**BS**	3	1	0	4	30	70	100
2	**A1205**	Electrical Machines - I	**PC**	3	1	0	4	30	70	100
3	**A1206**	Electro Magnetic Fields	**PC**	4	0	0	4	30	70	100
4	**A1207**	Electrical Circuits - II	**PC**	3	0	0	3	30	70	100
5	**A1401**	Electronic Devices and Circuits	**ES**	4	0	0	4	30	70	100
6	**A1208**	Electrical Machines – I Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1209**	Electrical Circuits and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1405**	Electronic Devices and Circuits Lab	**ES**	0	0	2	1	30	70	100
9	**A1013**	Verbal Ability and Logical Reasoning	**HS**	1	0	0	1	30	70	100
		TOTAL		**20**	**02**	**08**	**24**	**270**	**630**	**900**

B.Tech-IV SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1210**	Electrical Machines – II	**PC**	3	1	0	4	30	70	100
2	**A1211**	Control Systems	**PC**	3	1	0	4	30	70	100
3	**A1212**	Power Systems-I	**PC**	4	0	0	4	30	70	100
4	**A1414**	Linear and Digital Integrated Circuit Applications	**ES**	3	0	0	3	30	70	100
5	**A1701**	Managerial Economics & Financial Analysis	**HS**	3	0	0	3	30	70	100
6	**A1213**	Control Systems and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1214**	Electrical Machines – II Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1415**	Linear and Digital Integrated Circuit Applications Lab	**ES**	0	0	2	1	30	70	100
9	**A1012**	Quantitative Aptitude-I	**BS**	1	0	0	1	30	70	100
10	**A1215**	Comprehensive Online Examination-I	**PW**	0	0	0	1	-	100	100
		TOTAL		**19**	**02**	**08**	**24**	**270**	**730**	**1000**

B.Tech-III SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1014**	Linear Algebra and Complex Variables	**BS**	3	1	0	4	30	70	100
2	**A1205**	Electrical Machines - I	**PC**	3	1	0	4	30	70	100
3	**A1206**	Electro Magnetic Fields	**PC**	4	0	0	4	30	70	100
4	**A1207**	Electrical Circuits - II	**PC**	3	0	0	3	30	70	100
5	**A1401**	Electronic Devices and Circuits	**ES**	4	0	0	4	30	70	100
6	**A1208**	Electrical Machines – I Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1209**	Electrical Circuits and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1405**	Electronic Devices and Circuits Lab	**ES**	0	0	2	1	30	70	100
9	**A1013**	Verbal Ability and Logical Reasoning	**HS**	1	0	0	1	30	70	100
TOTAL				**20**	**02**	**08**	**24**	**270**	**630**	**900**

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

Course Overview:
This course offers more advanced topics of mathematics required to analyze the problems in engineering. Solution of system of linear equations, Eigen values and Eigen vectors, Quadratic forms, the basic principles (both theory and applications) of differentiable complex-valued functions of a single complex variable. Topics include the complex number system, Cauchy-Riemann conditions, analytic functions and their properties, Complex integration and line integrals,Cauchys theorem, Cauchy representation, conformal mapping, Taylor and Laurent Series expansions;Calculus of residues and various applications The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

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

Course Content:			
Unit-I	**THEORY OF MATRICES, EIGEN VALUES AND EIGEN VECTORS**	**Lecture Hours**	**10**
Rank of a matrix by reducing to Echelon form and Normal form, Consistency of system of linear equations using the rank of a matrix. Eigen values and Eigenvectors of real and complex matrices, Properties of Eigen values and Eigen vectors of real and complex matrices (without proof), Cayley-Hamilton theorem (statement and verification), Inverse and powers of a matrix using Cayley-Hamilton theorem, Diagonalization of a matrix.			
Unit-II	**QUADRATIC FORMS AND BETA-GAMMA FUNCTIONS**	**Lecture Hours**	**07**
Quadratic forms up to three variables: Rank, index, signature and nature of quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation. Beta-Gamma functions: Evaluation of improper integrals using Beta-Gamma functions**.**			

Unit-III	DIFFERENTIATION OF COMPLEX FUNCTIONS	Lecture Hours	09
Continuity, differentiability and analyticity of functions of a complex variable, Cauchy-Riemann equations in Cartesian and polar form(without proof), harmonic and conjugate harmonic functions, Milne-Thomson method. Conformal Mapping: Transformation of e^z,z^2Translation, rotation, inversion, bilinear transformation and their properties, determination of bilinear transformation of three given points.			
Unit-IV	**INTEGRATION OF COMPLEX FUNCTIONS**	**Lecture Hours**	**08**
Complex integration: Line integral in complex plane, Cauchy's integral theorem and Cauchy's integral formula (without proof), Zeros and singularities of analytic function. Complex power series: Taylor's series, Laurent's series			
Unit-V	**CALCULUS OF RESIDUES**	**Lecture Hours**	**08**
Residue-Evaluation of residue by laurent series- Residue theorem, Evaluation of real definite integrals of the form (i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ (ii) $\int_{-\infty}^{\infty} f(x)dx.$			

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

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

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(Autonomous)

Title of the Course :	**ELECTRICAL MACHINES-I**			
Branches for which this course is offered:	**III Semester**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview:
The constructional features of DC machines and different types of windings employed in DC machines, The phenomena of armature reaction and commutation and Characteristics of generators. Methods for speed control and testing of DC motors. Conduct of OC and SC tests on single phase transformers to determine the efficiency and regulation at any load power factors. Various starting and speed control methods of three phase induction motor.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Calculate the e.m.f. generated on open circuit, terminal voltage on load and load shared by each generator.
CO2	Determine the gross torque and useful torque developed by DC motor and Identify suitable methods to control speed f DC motors.
CO3	Calculate the losses and efficiency of DC generators and motors.
CO4	Conduct O.C, S.C tests and predetermine the regulation, efficiency and draw the equivalent circuit of transformer.
CO5	Compute the load shared by each transformer when several transformers operate in parallel.
CO6	Construct and operating characteristics of three phase induction motors, and various tests are conducted to construct the circle diagram to determine the performance of induction motors.

Course Content:			
Unit - I	**D.C. MACHINES**	**Lecture Hours**	**14**
D.C. Generators – Principle of Operation – Constructional Features –Windings– E.M.F Equation– Numerical Problems –Armature Reaction -Compensating Winding – Commutation – Methods of Improving Commutation -Types of generators– Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators – Parallel Operation of D.C Series Generators — Load Sharing- Applications **D.C Motors** – Principle of Operation – Back E.M.F.–Torque Equation – Characteristics of Shunt, Series and Compound Motors- Applications.			
Unit - II	**TESTING OF D.C.MACHINES AND SPEED CONTROL OF DC MOTORS**	**Lecture Hours**	**09**
Speed Control of D.C. Shunt and Series Motors. Principle and construction of Starters (3 &4Point). Testing of DC Machines- Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency. Methods of Testing – Direct, Indirect – Brake Test –			

Swinburne's Test – Hopkinson's Test – Field's Test – Retardation Test.			
Unit - III	**SINGLE PHASE TRANSFORMERS**	**Lecture Hours**	**10**
Single Phase Transformers- Constructional Details-Types of transformers Hysteresis and Eddy Current Losses-EMF Equation - Operation on No Load and on Load - Phasor Diagrams. Equivalent Circuit - Losses and Efficiency-Regulation. All Day Efficiency - Effect of Variations of Frequency & Supply Voltage on Iron Losses.			
Unit - IV	**TESTING OF TRANSFORMERS AND THREE PHASE INDUCTION MOTORS**	**Lecture Hours**	**14**
OC and SC Tests - Sumpner's Test - Separation of Losses Test-Parallel Operation of transformers with Equal and Unequal Voltage Ratios - Auto Transformers-Equivalent Circuit. **Three-Phase Induction Motors:** Polyphase Induction Motors-Constructional Details of Cage and Wound Rotor Machines-Production of Rotating Magnetic Field - Principle of Operation –Slip - Rotor Parameters at Standstill and under running conditions –Power flow diagram- Applications			
Unit - V	**TESTING AND SPEED CONTROL METHODS OF 3-PHASE INDUCTION MOTOR**	**Lecture Hours**	**08**
Torque Equations – Torque-Slip Characteristic – Equivalent Circuit - Phasor Diagram - Crawling and Cogging- -Circle Diagram-No Load and Blocked Rotor Tests-Predetermination of Performance, Starting methods and speed control of induction motor.			

Text Books:	
1.	Electrical Machinery, P.S. Bimbhra, Khanna Publishers, 7th Edition, 2011
2.	Theory and performance of Electrical Machines, J.B.Gupta, Kataria, S. K.& Sons Publications.
Reference Books:	
1.	The Performance and Design of Direct Current Machines, A.E. Clayton and N. N. Hancock, ELBS Publishers, First published 1927, First Edition of e-book 2012.
2.	Electrical Machines, S K Bhattacharya, McGraw Hill Education (India) Pvt. Ltd., 4th Edition, 2014, 3rd Reprint 2015.
3.	Electric Machinery, A.E.Fitzgerald, C.Kingsley and S. Umans, McGraw Hill Education (India) Pvt. Ltd., 6th Edition, 2005.
4.	Electric Machines 4th edition, D.P.Kothari and I.J. Nagrath, McGraw Hill Education (India) Pvt. Ltd., 4th Edition, 2010, 16th Reprint 2015.
5.	Electrical Machines, AshfaqHussain,DhanpatRai & Co, 2nd Edition, 2005
6.	Electrical Machines, R.K.Rajput, Laxmi Publications,5th Edition.2008
7.	Electrical Technology, B.L. Theraja and A.K.Theraja, S.Chand Publications,Volume-II,2006.
8.	NPTEL Online

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**ELECTRO MAGNETIC FIELDS**			
Branches for which this course is offered:	**III Semester**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview:
The primary objective of this course is to introduce the concepts of electric field and magnetic field and their effect on various applications. Various types of Maxwell's equations along with Amperes circuital law will be dealt in detail. The combined effect of electric field and magnetic field on a wave propagating through a medium will also be studied.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the behavior of static magnetic fields in standard configurations by applying vector calculus.
CO2	Apply vector calculus to generalize the behavior of static electric fields in standard configurations.
CO3	Analyze the inductance and capacitance for different structures.
CO4	Apply basic laws of electric, magnetic and electromagnetic fields to find force.
CO5	Analyze the effect of time varying fields involving both electric and magnetic field on a wave propagating through a medium along analysis of with modified Maxwell's equations for time varying fields.
CO6	Use of modern tool MATLAB to simulate electromagnetic fields of transmission lines.

Course Content:			
Unit - I	**INTRODUCTION TO COORDINATE SYSTEMS AND ELECTRO STATIC FIELDS**	**Lecture Hours**	**14**
Cartesian, cylindrical and spherical coordinate systems. Differential length, area and volume. Line, surface and volume integrals. Del operator, gradient of a scalar, divergence of a vector and divergence theorem. Curl of a vector and Stokes Theorem. Electrostatic Fields- Coulomb's Law- Definition of Electric Field Intensity (EFI) and Applications of EFI-Work done in moving a point charge in an electrostatic field- Electric Potential- due to point charges, line charges and volume charges- Potential gradient- Gauss's law - Application of Gauss's Law- Maxwell's first law. Laplace's and Poison's equations-Electric dipole- Dipole moment- potential and EFI due to an electric dipole- Torque on an Electric dipole in a electric field.			
Unit - II	**CONDUCTORS , DIELECTRICS AND CAPACITANCE**	**Lecture Hours**	**10**
Behaviour of conductors in an electric field- Conductors and Insulators- Electric field inside a dielectric material- polarization- Dielectric – Conductor and Dielectric- Dielectric boundary conditions – Capacitance- Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – Conduction and Convention current densities – Ohm's law in point form – Equation of continuity.			
Unit - III	**STATIC MAGNETIC FIELDS AND FORCE IN MAGNETIC FIELDS**	**Lecture Hours**	**12**

Biot-Savart's law in vector form ,Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, solenoid current Carrying wire –Maxwell‟s second Equation, div(B)=0. Ampere's circuital law and its applications– Point form of Ampere‟s circuital law – Maxwell‟s third equation, Curl (H)=J.

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight, long current and two straight long and 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**	**Lecture Hours**	**10**

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 and mutual inductance between a straight, long wire and a square loop wire in the same plane – energy stored and density in a magnetic field-- Numerical Problems.

Unit - V	**MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVE PROPAGATION**	**Lecture Hours**	**11**

Faraday's laws of electromagnetic induction – Integral and point forms – Maxwell's fourth equation. Statically and dynamically induced E.M.F's – Simple problems – 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 Theorem and Poynting vector.

Text Books:

1.	Engineering Electromagnetics, William.H.Hayt, Mc.Graw Hill, 2010.
2.	Electromagnetic Fields, S.Sivanagaraju ,C.Srinivasa Rao (2008), New Age publications.

References Books:

1.	Field Theory, K.A. Gangadhar, Khanna Publications, 2003.
2.	Electromagnetics 5th edition, J.D.Kraus, Mc.Graw – Hill Inc, 1999.
3.	Electromagnetics, Joseph Edminister, Tata Mc Graw Hill, 2006
4.	Principles of Electromagnetics, 6th Edition, Sadiku, Kulkarni, OXFORD University Press, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**ELECTRICAL CIRCUITS – II**			
Branches for which this course is offered:	**III Semester**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview:
The primary objective of this course is to give the fundamentals of electric circuit analysis equivalents. It introduces analyzing of transient and steady state characteristics of circuits for DC and AC excitation. The emphasis of this course is laid on the basic analysis of circuits which includes three phase circuits, Fourier Transforms and filters.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Analyze three phase balanced and unbalanced circuits and determine line voltages, line currents, phase voltages and phase currents
CO2	Measure active and reactive power consumed by a given three phase circuit
CO3	Determine the transient response of R-L, R-C, R-L-C circuits for D.C and A.C excitations
CO4	Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources
CO5	Design different types of filters.

Course Content:			
Unit - I	**TRANSIENT RESPONSE ANALYSIS**	**Lecture Hours**	**10**
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 - II	**POLY PHASE CIRCUITS**	**Lecture Hours**	**12**
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. Single wattmeter and two wattmeter method.			
Unit - III	**GRAPH THEORY**	**Lecture Hours**	**12**
Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks. Super Node and Super Mesh for D.C Excitations.			

Unit - IV	**FOURIER TRANSFORMS**	**Lecture Hours**	**12**
Fourier Theorem- Trigonometric Form and Exponential Form of Fourier Series – Conditions of Symmetry- Line Spectra and Phase Angle Spectra- Analysis of Electrical Circuits excited by Non Sinusoidal sources of Periodic Waveforms. Fourier Integrals and Fourier Transforms – Properties of Fourier Transforms and Application to Electrical Circuits.			
Unit - V	**FILTERS**	**Lecture Hours**	**12**
Filters – Low Pass, High Pass, Band Pass and Band stop filters – RC, RL filters, Constant K filters, m derived filters and composite filter design.			

Text Books:	
1.	Electrical Circuit Theory and Technology, John Bird, ELSEVIER, 4th Edition, 2010.
2.	Network Analysis, M.E Van Valkenburg, Pearson Education, 3rd Edition, 2015.
References Books:	
1.	Circuit Theory (Analysis & Synthesis), A. Chakrabarti, DhanpatRai& Co.,6th Edition, 2008.
2.	Electric Circuits by N.Sreenivasulu, REEM Publications Pvt. Ltd., 2012
3.	Engineering circuit analysis by William Hayt, Jack E. Kemmerly and Steven M. Durbin, McGrawHill Education (India) Pvt. Ltd., 6th Edition, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**ELECTRONIC DEVICES AND CIRCUITS**			
Branches for which this course is offered:	**III Semester (EEE&ECE)**	**L**	**T**	**C**
		4	**0**	**4**

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

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

Course Content:			
Unit – I	**PN DIODE CHARACTERISTICS**	**Lecture Hours**	**12**
PN diode – Operation, biasing, characteristics, equation, static and dynamic resistance. Effect of temperature on VI characteristics of a diode, ideal vs practical diode, diode equivalent circuits. **Special Diodes:** Zener diode, Tunnel diode, LED, Photo diode– construction, operation and Characteristics.			
Unit – II	**RECTIFIERS & FILTERS**	**Lecture Hours**	**10**
Block diagram of regulated power supply, Half wave rectifier, Full wave rectifier and Bridge rectifier, characteristics of rectifiers and comparison of rectifier circuits. Filters – Derivation of ripple factor for Inductor, Capacitor, L-section and Π section filters, Zener diode as a voltage regulator.			
Unit – III	**TRANSISTOR CHARACTERISTICS (BJT & FET)**	**Lecture Hours**	**08**
BJT: Structure and principle of operation, Transistor as an amplifier, Transistor configurations (CE, CB, CC), input and output characteristics. **FET:** Construction, operation and characteristics of JFET and MOSFET.			
Unit – IV	**TRANSISTOR BIASING**	**Lecture Hours**	**09**
DC & AC load line, criteria for fixing operating point, factors affecting operating point, Methods of biasing– fixed bias, self-bias, collector to base bias, stability factors (S, S', S''). Thermal runaway, condition for thermal stability.			
Unit – V	**ANALYSIS OF TRANSISTOR AMPLIFIER AT LOW FREQUENCY**	**Lecture Hours**	**09**
BJT: Analysis of CE, CB and CC amplifiers using exact and approximate h-parameter model. **FET:** Analysis of CS and CD amplifiers.			

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**ELECTRICAL MACHINES-I LAB**		
Branches for which this course is offered:	**III Semester**	**P**	**C**
		3	**1.5**

Course Overview:
The objective of the DC Machine Lab is to expose the students to the operation of DC machines and give them experimental skill. It also aims to understand the generation of DC voltages by using different types of generators and study their performance and enable the students to understand the working principles of DC motors and their load characteristics, starting and methods of speed control. Further it helps to familiarize with the constructional details of different types of DC generators, DC motors working principle and their performance.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Evaluate the open circuit characteristics in order to find the critical resistance, speed and also list out the external and internal characteristics of dc shunt machines.
CO2	Perform the load test and brake test on DC shunt generator and motor in order to determine the performance characteristics.
CO3	Determine the efficiency of DC shunt and series machines through fields test and Hopkinson's test respectively.
CO4	Predetermine the efficiency of DC shunt motor by conducting Swinburne's test.
CO5	Draw the characteristics of DC series generator by conducting load test and also carry out the separation of losses in DC shunt motor
CO5	Analyze the performance curves of DC compound motor by conducting brake test on the motor

List of Experiments:

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 load characteristics
4. Load test on DC Series generator. Determination of load characteristics.
5. Load test on DC Compound generator. Determination of load 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 efficiency.
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 Shunt motor.

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Title of the Course :	**ELECTRICAL CIRCUITS AND SIMULATION LAB**		
Branches for which this course is offered:	**III Semester**	**P**	**C**
		3	**1.5**

Course Overview:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is the various electric circuit concepts through circuit simulation using PSPICE software, performance of RLC series and parallel circuits through simulation studies, the analysis of 3-phase balanced and unbalanced circuits by simulation, the occurrence of transients in electric circuits with both DC and AC excitations.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Explain electric circuit concepts by interpreting the simulation results
CO2	Design RLC series circuit for specified frequency response
CO3	Analyze three phase balanced and unbalanced circuits
CO4	Design RL, RC and RLC circuits for specified transient response
CO5	Design and Frequency Response of Low Pass and High Pass

List of Experiments:

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 and Frequency Response of Low Pass and High Pass Filters

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

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

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

List of Experiments:

1. **Electronic Workshop Practice** :Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. **Electronic Workshop Practice**: Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO
3. P-N Junction Diode Characteristics
4. Zener Diode Characteristics
5. Zener Diode as a Voltage Regulator
6. Half-wave Rectifier without and with C-filter
7. Full-wave Rectifier without and with C-filter
8. BJT Characteristics (CE Configuration)
9. BJT Characteristics (CB Configuration)
10. FET Characteristics(CS Configuration)
11. Transistor Biasing
12. CE Amplifier

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course	**VERBAL ABILITY AND LOGICAL REASONING**		
Branch for which this course is offered	**III Semester (ECE & EEE)**	**L**	**C**
		1	**1**

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

Course Content:			
UNIT – I	**CODING AND DECODING**	**Lecture Hours**	**03**
Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out			
UNIT – II	**ARTICLES AND TENSES, DIRECTION SENSE**	**Lecture Hours**	**03**
a)Articles and Tenses: Introduction, usage of articles, Omission of Articles, Types of tenses, Forms and Usage of tenses b)Direction Sense: Introduction, Distance method, Facing Method and Shadow Method			
UNIT – III	**BLOOD RELATIONS, VOICES AND FORMS OF SPEECH**	**Lecture Hours**	**03**
a) Blood Relations: Introduction, Direct, Puzzle and Coded models b) Voices and Forms of Speech: Introduction, conversion of active and passive voice, conversions of direct and indirect speech.			
UNIT – IV	**DATA ARRANGEMENTS, SYLLOGISMS**	**Lecture Hours**	**04**
a) Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements b) Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method			
UNIT – V	**VISUAL REASONING, SENTENCE CORRECTION**	**Lecture Hours**	**03**
a) Visual Reasoning: Patterns, Folded Images, Cubes and Analytical Reasoning b) Sentence Correction: Subject-Verb Agreement, Pronoun Antecedent, Parallelism, Verb-Time Sequence Error, Determiners and Modifiers			

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

B.Tech-IV SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1210**	Electrical Machines – II	**PC**	3	1	0	4	30	70	100
2	**A1211**	Control Systems	**PC**	3	1	0	4	30	70	100
3	**A1212**	Power Systems-I	**PC**	4	0	0	4	30	70	100
4	**A1414**	Linear and Digital Integrated Circuit Analysis	**ES**	3	0	0	3	30	70	100
5	**A1701**	Managerial Economics & Financial Analysis	**HS**	3	0	0	3	30	70	100
6	**A1213**	Control Systems and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1214**	Electrical Machines – II Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1415**	Linear and Digital Integrated Circuit Analysis Lab	**ES**	0	0	2	1	30	70	100
9	**A1012**	Quantitative Aptitude-I	**BS**	1	0	0	1	30	70	100
10	**A1215**	Comprehensive Online Examination-I	**PW**	0	0	0	1	-	100	100
		TOTAL		**19**	**02**	**08**	**24**	**270**	**730**	**1000**

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Title of the Course :	**ELECTRICAL MACHINES-II**			
Branches for which this course is offered:	**IV Semester**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview:
The objectives of the course are to make the student learn about the construction and principle of working of different connections of three phase transformers and synchronous machines, different methods of predetermining the regulation of alternators, the concepts and computation of load sharing among alternators in parallel. The performance characteristics of synchronous motors and their use as synchronous condensers for power factor improvement. Different types of single phase motors and special motors used in house hold appliances and control systems.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Identify the three phase transformers employed in distribution and transmission system based on their connections.
CO2	Understand the construction and principle of operation of round rotor and salient pole machines along with E.M.F Equation.
CO3	Determine experimentally the characteristics of synchronous generator along with phasor diagram and also evaluate the regulation by synchronous impedance method, M.M.F method and Z.P.F method
CO4	Interpret the parallel operation of synchronous generators and determination of sub-transient, transient and steady state reactance's
CO5	Explain the principle of operation of synchronous motor along with V and Inverted V curves and also describe the concept of hunting and methods of starting in synchronous induction motor
CO6	Infer the constructional features of single phase motor along with double revolving field theory and elementary idea of cross-field theory. Carry out a detailed analysis on special motors which include A.C series motor, universal motor and stepper motor.

Course Content:			
Unit - I	**THREE PHASE TRANSFORMERS**	**Lecture Hours**	**10**
Three phase transformer connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ, Third harmonics in phase voltages Three-winding transformers-tertiary windings, Scott connection, Numerical Problems.			
Unit - II	**3-PHASE ALTERNATORS**	**Lecture Hours**	**10**
Principle and Constructional Features of Salient Pole and Round Rotor Machines – Windings and Factors – E.M.F Equation - Armature Reaction – Synchronous Reactance and Impedance – Load Characteristics - Phasor Diagram- Applications.			
Unit - III	**REGULATION AND PARALLEL OPERATION OF ALTERNATORS:**	**Lecture Hours**	**12**
Regulation of Salient Pole Alternator – Voltage Regulation Methods, Two Reaction Theory – Determination of Xd and Xq (Slip Test) – Phasor Diagrams. Power Flow Equation in Alternators (Cylindrical and Salient Pole Machines) – Synchronizing Power and Torque – Parallel Operation and Load Sharing – Effect of Change of Excitation and			

Mechanical Power Input – Synchronizing Alternator with Infinite Bus Bars .			
Unit - IV	**3- PHASE SYNCHRONOUS MOTORS**	**Lecture Hours**	**10**
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- Applications.			
Unit - V	**SINGLE PHASE INDUCTION MOTORS**	**Lecture Hours**	**12**
Single Phase Induction Motors - Constructional Features – Double Revolving Field Theory- Elementary Idea of Cross Field Theory – Split Phase Motors – Capacitor Start and Run Motors – Shaded Pole Motor. Principle and Performance of A.C Series Motor - Universal Motor-Stepper Motor- Applications.			

Text Books:	
1.	1. Electrical Machinery, P.S. Bimbhra, Khanna Publishers, 7th Edition, 2011.
2.	Electric Machines 4th edition, D.P.Kothari and I.J. Nagrath, McGraw Hill Education (India) Pvt. Ltd., 4th Edition, 2010, 16th Reprint 2015.
References Books:	
1.	Electrical Machines, AshfaqHussain,DhanpatRai & Co, 2nd Edition, 2005.
2.	Electrical Machines, R.K.Rajput, Laxmi Publications,5th Edition.2008.
3.	Electrical Technology, B.L. Theraja and A.K.Theraja, S.Chand Publications,Volume-II,2006.
4.	Theory of Alternating Current Machinery, Alexander S.Langsdorf, Tata McGraw-Hill, 2nd edition, 1999, 35th Reprint.
5.	A Textbook of Electrical Machines, K R Siddhapura and D B Raval, Vikas Publishing House Pvt. Ltd., 2014.
6.	Theory and performance of Electrical Machines, J.B.Gupta, Kataria, S. K.& Sons Publications.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course:	**CONTROL SYSTEMS**			
Branches for which this Course is offered:	**IV Semester (EEE & ECE)**	**L**	**T**	**C**
		3	**1**	**4**

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

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

Course Content:			
Unit - I	**MODELING OF PHYSICAL SYSTEMS**	**Lecture Hours**	**10**
Types of control systems- Examples-Comparisons- characteristics of feedback systems, Mathematical modeling and differential equations of physical systems, concept of transfer function, translational and rotational mechanical systems, electrical systems, force, voltage and force, current analogy.			
Unit -II	**BLOCK DIAGRAM REDUCTION TECHNIQUES AND TIME RESPONSE ANALYSIS**	**Lecture Hours**	**12**
Block diagram representation of various systems - Signal flow graph, Mason's gain formula. Transfer Function of DC Servo motor - Characteristics of AC Servo motor - Synchro transmitter and Receiver. Time response analysis: Standard test signals, shifted unit step, impulse response, unit step response of first and second order systems, time response specifications, steady state errors and error constants, dynamic error coefficients method, Effects of proportional, derivative and proportional derivative, proportional integral and PID controllers.			

Unit-III	**CONCEPT OF STABILITY AND ROOT LOCUS TECHNIQUE**	**Lecture Hours**	**12**
Introduction to stability Necessary and sufficient conditions for stability, Routh's and Routh Hurwitz stability criterions and limitations. Root locus technique: Introduction, root locus concept, construction of root loci, graphical determination of 'k' for specified damping ratio, relative stability, effect of adding zeros and poles on stability.			
Unit-IV	**FREQUENCY DOMAIN ANALYSIS AND COMPENSATORS**	**Lecture Hours**	**10**
Frequency domain analysis: Introduction, frequency domain specifications, stability analysis from Bode plot, Nyquist plot, calculation of gain margin and phase margin, determination of transfer function, correlation between time and frequency responses Compensators: Lag, lead, lead - lag networks.			
Unit-V	**STATE SPACE ANALYSIS**	**Lecture Hours**	**12**
State Space Analysis: Concept of state, state variables and state model, derivation of state models from block diagrams, diagonalization, solving the time invariant state equations, state transition matrix and properties, concept of controllability and observability			

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

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

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Title of the Course :	**POWER SYSTEMS - I**			
Branches for which this course is offered:	**IV Semester**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview:
The primary objective of this course is to represent how electrical power plays a significant role in day to day life of entire mankind. The course introduces the principles and concepts involved in power generation. The course concerns the generation of conventional and non-conventional sources of energy. The course deals with the process involved in power generation in thermal, hydro and nuclear power stations and also due to various types of non-conventional sources like solar, wind, biogas, geothermal and ocean. The course also deals with the economic aspects of power generation and different tariff methods.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Recognize the importance of power generation and difference between renewable and non-renewable energy sources, recall the process of nuclear fission and chain reaction.
CO2	Analyze the construction, working and operating principle, and essential components of various power generating stations with their relative merits and demerits.
CO3	Design the layout and select the optimal location for different power plants along with its relevant features.
CO4	Analyze the different methods and characteristics of solar, wind, biogas, geothermal and ocean power generating systems along with their economic and environmental aspects.
CO5	Carry out a detailed analysis on the economic aspects of power generation involving various tariff methods and costs of generation.

Course Content:			
Unit - I	**STRUCTURE OF POWER SYSTEMS &THERMAL POWER STATIONS**	**Lecture Hours**	**10**
Structure of Power Systems: Components of an electric power system - Overview of conventional and non-conventional sources of energy, Single line diagram of electrical power system, important terms & factors. Base load and peak load on power station. **Thermal Power Station**: Line Diagram of Thermal Power Station (TPS) showing paths of Coal, Steam, Water, Air, Ash and Flue Gases - TPS Components: Economizers, Boilers, Super Heaters, Turbines, Condensers, Chimney and Cooling Towers.			
Unit - II	**HYDRO ELECTRIC POWER & NUCLEAR POWER STATIONS**	**Lecture Hours**	**14**
Hydro Power Station: Elements of hydroelectric power station, types, concept of pumped storage plants, mass curve and estimation of power developed from a given catchment area, heads and efficiencies. Hydraulic turbines: Classification of turbines, impulse and reaction turbines,			

Pelton wheel, Francis turbine and Kaplan turbine

Nuclear Power Station: Nuclear Fission and Chain Reaction.- Nuclear Fuels.- Principle of Operation of Nuclear Reactor.-Reactor Components: Moderators, Control Rods, Reflectors and Coolants.- Radiation Hazards: Shielding and Safety Precautions.- Types of Nuclear Reactors and Brief Description of PWR, BWR and FBR.

Unit - III	**PV GENERATION& WIND POWER MILLS**	**Lecture Hours**	**14**

PV 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 Mills :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	**BIOGAS, GEOTHERMAL& OCEAN POWER PLANTS**	**Lecture Hours**	**14**

Biogas Power Plant: Principles of Bioconversion, Types of Biogas Digesters – Characteristics of Bio-Gas- Utilization- Economic and Environmental Aspects.

Geothermal and Ocean Power Plants: Principle of Geothermal Energy Methods of Harnessing-Principle of OTEC-Tidal Plants and Wave Energy Plants- Mini Hydel Plants-Economic Aspects.

Unit - V	**ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF METHODS**	**Lecture Hours**	**12**

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. Methods of determining Depreciation-Tariff Methods: Desirable Characteristics of a Tariff Method- Flat Rate, Block-Rate, Two-Part, Three –Part, and Power Factor Tariff Methods and Numerical Problems.

Text Books:

1.	A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, DhanpatRai& Co. Pvt. Ltd., 1999.
2.	Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.

References Books:

1.	Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.
2.	Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3.	Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.
4.	Wind Electrical Systems by S. N. Bhadra, D. Kastha& S. Banerjee – Oxford University Press, 2013.
5.	Non Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.

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Title of the Course :	**LINEAR AND DIGITAL INTEGRATED CIRCUIT APPLICATIONS**			
Branches for which this course is offered:	**IV Semester (EEE)**	**L**	**T**	**C**
		3	**0**	**3**

Course Overview:
Integrated circuit is electronics and this course IC applications acquaints the students with general analog principles and design methodologies using practical devices and applications. It focus on process of learning about signal condition, signal generation, instrumentation, timing and control using various IC circuitry. 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. This course focuses on analysis, design and applications of modern digital integrated circuits.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the internal operation of Op-Amp and its specifications.
CO2	Operate 555 timer in different modes like monostable and astable operations and study their applications and discuss about various DAC and ADC techniques
CO3	Analyze and design applications like filters using Op-Amp and discuss about oscillators.
CO4	Apply basic switching concepts for realizing logic circuits.
CO5	Analyze and design combinational and sequential circuits.
CO6	Write VHDL code for any type of logic circuit.

Course Content:			
Unit - I	**OP-AMP CHARACTERISTICS & APPLICATIONS-I**	**Lecture Hours**	**16**
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, trans-conductance and trans-resistance converters, S&H circuits, analog multiplier and divider, Differentiator and Integrator, Comparators, Schmitt trigger.			
Unit - II	**OP-AMP APPLICATIONS-II:**	**Lecture Hours**	**10**
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, waveform generators- triangular, saw tooth and square wave.			
Unit - III	**OP-AMP APPLICATIONS-III :**	**Lecture Hours**	**11**
555 timer – Introduction, Functional diagram of IC-555, modes of 555 timer - operation and applications, Schmitt Trigger. **PLL –** Introduction, Schematic diagram, principles and description of individual blocks of analog			

IC565.

D-A and A-D Converters – Basic concept of DAC, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, various types of ADCs – Parallel comparator type ADC, Counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC specifications.

Unit - IV	**BINARY SYSTEMS AND GATE LEVEL MINIMIZATION**	**Lecture Hours**	**11**

Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, The Map Method, Four Variable Map, Don't-Care Conditions, NAND and NOR Implementation.

Unit - V	**COMBINATIONAL & SEQUENTIAL CIRCUITS**	**Lecture Hours**	**12**

Combinational: Code converters, Decoders, Demultiplexers, Seven segment display. Encoder, priority Encoder, Multiplexers & their analysis, priority generators/checker circuits. Digital arithmetic circuits- binary adder/subtractor circuits using 2"s Complement system. 4-bit comparator circuit.

Sequential: Latches, Flip-flops & their conversions.Design of synchronous counters, Decade counter, shift registers & applications.

Text Books:

1.	Linear Integrated Circuits – D.Roy Chowdhury, New Age International (p) Ltd,2nd Edition., 2003.
2.	Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
3.	Digital Design, M.Morris Mano & Micheal D. Ciletti, Pearson, 5th Edition, 2013.

References Books:

1.	Operational Amplifiers & Linear Integrated Circuits: Theory & Applications –Denton J.Daibey,TMH.
2.	Op-amps & Linear ICs – Ramakanth A.Gayakwad, PHI, 1987
3.	Digital Logic Design, R.D. Sudhakar Samuel, Elsevier

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Title of the Course	**CONTROL SYSTEMS AND SIMULATION LAB**		
Branches for which this Course is offered:	**IV Semester**	**P**	**C**
		3	**1.5**

Course Overview:
The objective of this lab is to make the student practically learn about • The effects of feedback on system performance • Determination of transfer functions of DC Machine. • The design of controllers/compensators to achieve desired specifications. • The characteristics of servo mechanisms used in automatic control applications

COURSE OUTCOMES:	
After Successful Completion of this course, the student will able to	
CO1	Design the controllers/compensators to achieve desired specifications.
CO2	Understand the effect of location of poles and zeros on transient and steady state behavior of systems.
CO3	Assess the performance, in terms of time domain specifications, of first and second order systems.
CO4	Understand the concepts of PLC and develop the PLC programs
CO5	Use MATLAB/SIMULINK software for control system analysis and design.

List of Experiments:

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. Lag and Lead Compensation-Magnitude and Phase Plot
8. Temperature Controller Using PID
9. Characteristics of Magnetic Amplifiers
10. Characteristics of AC Servomotor
11. PSPICE Simulation of Op-Amp Based Integrator and Differentiator Circuits
12. Linear System Analysis (Time Domain Analysis, Error Analysis) Using MATLAB
13. Stability Analysis (Bode, Root Locus, Nyquist Plot)of Linear Time Invariant System Using MATLAB
14. State Space Model for Classical Transfer Function Using MATLAB-Verification.
15. Step Response of a State Model
16. Impulse Response of a State Model

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Title of the Course :	**ELECTRICAL MACHINES-II LAB**		
Branches for which this course is offered:	**IV Semester**	**P**	**C**
		3	**1.5**

Course Overview:
The Primary objective of the Lab is to make the student learn about conducting the different tests on single phase transformers and three phase induction motors to determine the performance and efficiency, which are used in power transmission systems and industrial areas and also students able to learn about various tests are conducted on three phase synchronous machines to determine the regulation of alternator and its characteristics.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Conduct suitable tests on single phase transformer and pre determine the efficiency and regulation at different loading conditions.
CO2	Perform the regulation of alternator by EMF and MMF methods in order to evaluate voltage regulation at different power factors.
CO3	Carry out No load and blocked rotor tests on three phase induction motor to determine efficiency and also to draw the performance characteristics.
CO4	Analyze the equivalent circuit diagrams of single phase induction motor by conducting various tests.
CO5	Conduct the brake test on 3 phase induction motors and evaluate the performance characteristics
CO6	Convert 3 phase to 2 phase connection in 3 phase transformer through Scott connection

List of Experiments:

1. O.C & S.C Test on Single Phase Transformer
2. Sumpner's Test on a Pair of Identical Single Phase Transformers
3. Scott Connection of Transformers
4. No load and Blocked Rotor Tests on Three Phase Induction Motor
5. Regulation of Three Phase Alternator By Synchronous Impedance & M.M.F Methods
6. No load and Blocked Rotor Test on Single Phase Induction Motor
7. Determination of X_d & X_q of a Salient Pole Synchronous Machine
8. V and Inverted V Curves of Three Phase Synchronous Motor.
9. Separation of core losses of a single phase Transformer
10. Brake Test on Three Phase Induction Motor

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Title of the Course :	**LINEAR AND DIGITAL INTEGRATED CIRCUIT APPLICATIONS LAB**		
Branches for which this course is offered:	**IV Semester**	**P**	**C**
		3	**1**

Course Overview:
The objective of the Linear and Digital IC Analysis lab is to expose the students to design the analog and digital ICs and give them experimental skill. It also aims to understand the generation of various shapes of signals and study their performance and enable the students to understand the working of Analog and Digital ICs and their applications.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Study the closed-loop Op-amp configurations.
CO2	Generate sinusoidal, triangular & square waveform using op-amp.
CO3	Design and verify the frequency response of the filters using TL082 Op – Amp.
CO4	Design and draw the internal structure of various logic gates.
CO5	Implement Combinational circuits using VHDL source code.
CO5	Develop VHDL source code and perform simulation.

List of Experiments:

1. Design and analyze (a) Unity gain amplifier.
   (b) Non – Inverting amplifier.
   (c) Inverting amplifier
2. Instrumentation amplifier configurations with three op-amps.
3. Frequency response of practical Integrator.
4. Frequency response of practical differentiator.
5. Astable multivibrator using 555 timer.
6. Design and analyze the responses of Function generator.
7. Design and plot the frequency response of low pass and high pass filter.
8. R-2R Ladder Digital to Analog Converter.
9. Realization of logic gates.
10. 3X8 Decoder – 74138.
11. 8X1 Multiplexer – 74151.
12. 4 – bit Comparator – 7485.
13. D – Flip-flop – 7474.
14. Shift Registers - 7495

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Title of the Course:	**QUANTITATIVE APTITUDE -1**		
Branches for which this course is offered:	**IV Semester**	**L**	**C**
		1	**1**

Course Content:			
Unit – I	**RATIO AND PROPORTION, AVERAGE, MIXTURES AND ALLEGATION**	**Lecture Hours**	**04**
Ratio and Proportion: Ratio, Proportion, Variations, Problems on Ages **Average, Mixtures and Allegation**: Averages, Weighted average, Difference between mixture and allegation, Problems on Mixtures and allegation			
Unit – II	**PERCENTAGES,SI& CI, DATA INTERPRETATION**	**Lecture Hours**	**03**
Percentages,SI& CI: Fundamentals of Percentage,Percentage change, SI and CI,Relation between SI, CI **Data Interpretation:** Introduction,Tabulation, Bar Graph, Pie Charts, Line Graphs,Combined Graphs.			
Unit -III	**PROFIT AND LOSS, PARTNERSHIPS, LOGARITHMS**	**Lecture Hours**	**03**
Profit and loss, Partnerships: Basic terminology in profit and loss, Types of partnership, Problems related to partnership **Logarithms:** Fundamental formulae of logarithms and problems, finding no of terms on expanding a given number.			
Unit- IV	**PERMUTATION AND COMBINATION**	**Lecture Hours**	**03**
Permutation and combination: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to numbers, Circular permutation, Combination			
Unit –V	**CLOCKS AND CALENDAR**	**Lecture Hours**	**03**
Clocks: Introduction, Finding angle between hands of clock, Gain/Loss of Time, Finding time, Gain or loss of time **Calendar:** Calendars method- 1,Calendars method -2			

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

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Course Structure for B.Tech - R18 Regulations
ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech-III SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1014**	Linear Algebra and Complex Variables	**BS**	3	1	0	4	30	70	100
2	**A1205**	Electrical Machines - I	**PC**	3	1	0	4	30	70	100
3	**A1206**	Electro Magnetic Fields	**PC**	4	0	0	4	30	70	100
4	**A1207**	Electrical Circuits - II	**PC**	3	0	0	3	30	70	100
5	**A1401**	Electronic Devices and Circuits	**ES**	4	0	0	4	30	70	100
6	**A1208**	Electrical Machines – I Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1209**	Electrical Circuits and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1405**	Electronic Devices and Circuits Lab	**ES**	0	0	2	1	30	70	100
9	**A1013**	Verbal Ability and Logical Reasoning	**HS**	1	0	0	1	30	70	100
		TOTAL		**20**	**02**	**08**	**24**	**270**	**630**	**900**

B.Tech-IV SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1210**	Electrical Machines – II	**PC**	3	1	0	4	30	70	100
2	**A1211**	Control Systems	**PC**	3	1	0	4	30	70	100
3	**A1212**	Power Systems-I	**PC**	4	0	0	4	30	70	100
4	**A1414**	Linear and Digital Integrated Circuit Applications	**ES**	3	0	0	3	30	70	100
5	**A1701**	Managerial Economics & Financial Analysis	**HS**	3	0	0	3	30	70	100
6	**A1213**	Control Systems and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1214**	Electrical Machines – II Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1415**	Linear and Digital Integrated Circuit Applications Lab	**ES**	0	0	2	1	30	70	100
9	**A1012**	Quantitative Aptitude-I	**BS**	1	0	0	1	30	70	100
10	**A1215**	Comprehensive Online Examination-I	**PW**	0	0	0	1	-	100	100
		TOTAL		**19**	**02**	**08**	**24**	**270**	**730**	**1000**

B.Tech-III SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1014**	Linear Algebra and Complex Variables	**BS**	3	1	0	4	30	70	100
2	**A1205**	Electrical Machines - I	**PC**	3	1	0	4	30	70	100
3	**A1206**	Electro Magnetic Fields	**PC**	4	0	0	4	30	70	100
4	**A1207**	Electrical Circuits - II	**PC**	3	0	0	3	30	70	100
5	**A1401**	Electronic Devices and Circuits	**ES**	4	0	0	4	30	70	100
6	**A1208**	Electrical Machines – I Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1209**	Electrical Circuits and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1405**	Electronic Devices and Circuits Lab	**ES**	0	0	2	1	30	70	100
9	**A1013**	Verbal Ability and Logical Reasoning	**HS**	1	0	0	1	30	70	100
TOTAL				**20**	**02**	**08**	**24**	**270**	**630**	**900**

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

Course Overview:

This course offers more advanced topics of mathematics required to analyze the problems in engineering.

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

Course Outcomes :

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

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

Course Content:

Unit-I	**THEORY OF MATRICES, EIGEN VALUES AND EIGEN VECTORS**	**Lecture Hours**	**10**

Rank of a matrix by reducing to Echelon form and Normal form, Consistency of system of linear equations using the rank of a matrix. Eigen values and Eigenvectors of real and complex matrices, Properties of Eigen values and Eigen vectors of real and complex matrices (without proof), Cayley-Hamilton theorem (statement and verification), Inverse and powers of a matrix using Cayley-Hamilton theorem, Diagonalization of a matrix.

Unit-II	**QUADRATIC FORMS AND BETA-GAMMA FUNCTIONS**	**Lecture Hours**	**07**

Quadratic forms up to three variables: Rank, index, signature and nature of quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation. Beta-Gamma functions: Evaluation of improper integrals using Beta-Gamma functions**.**

Unit-III	**DIFFERENTIATION OF COMPLEX FUNCTIONS**	**Lecture Hours**	**09**

Continuity, differentiability and analyticity of functions of a complex variable, Cauchy-Riemann equations in Cartesian and polar form(without proof), harmonic and conjugate harmonic functions, Milne-Thomson method. Conformal Mapping: Transformation of e^z, z^2Translation, rotation, inversion, bilinear transformation and their properties, determination of bilinear transformation of three given points.			
Unit-IV	**INTEGRATION OF COMPLEX FUNCTIONS**	**Lecture Hours**	**08**
Complex integration: Line integral in complex plane, Cauchy's integral theorem and Cauchy's integral formula (without proof), Zeros and singularities of analytic function. Complex power series: Taylor's series, Laurent's series			
Unit-V	**CALCULUS OF RESIDUES**	**Lecture Hours**	**08**
Residue-Evaluation of residue by laurent series- Residue theorem, Evaluation of real definite integrals of the form (i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ (ii) $\int_{-\infty}^{\infty} f(x)dx.$			

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

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

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Title of the Course :	**ELECTRICAL MACHINES-I**			
Branches for which this course is offered:	**III Semester**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview:
The constructional features of DC machines and different types of windings employed in DC machines, The phenomena of armature reaction and commutation and Characteristics of generators. Methods for speed control and testing of DC motors. Conduct of OC and SC tests on single phase transformers to determine the efficiency and regulation at any load power factors. Various starting and speed control methods of three phase induction motor.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Calculate the e.m.f. generated on open circuit, terminal voltage on load and load shared by each generator.
CO2	Determine the gross torque and useful torque developed by DC motor and Identify suitable methods to control speed f DC motors.
CO3	Calculate the losses and efficiency of DC generators and motors.
CO4	Conduct O.C, S.C tests and predetermine the regulation, efficiency and draw the equivalent circuit of transformer.
CO5	Compute the load shared by each transformer when several transformers operate in parallel.
CO6	Construct and operating characteristics of three phase induction motors, and various tests are conducted to construct the circle diagram to determine the performance of induction motors.

Course Content:			
Unit - I	**D.C. MACHINES**	**Lecture Hours**	**14**
D.C. Generators – Principle of Operation – Constructional Features –Windings– E.M.F Equation– Numerical Problems –Armature Reaction -Compensating Winding – Commutation – Methods of Improving Commutation -Types of generators– Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators – Parallel Operation of D.C Series Generators — Load Sharing- Applications **D.C Motors** – Principle of Operation – Back E.M.F.–Torque Equation – Characteristics of Shunt, Series and Compound Motors- Applications.			
Unit - II	**TESTING OF D.C.MACHINES AND SPEED CONTROL OF DC MOTORS**	**Lecture Hours**	**09**
Speed Control of D.C. Shunt and Series Motors. Principle and construction of Starters (3 &4Point). Testing of DC Machines- Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency. Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test – Hopkinson's Test – Field's Test – Retardation Test.			
Unit - III	**SINGLE PHASE TRANSFORMERS**	**Lecture Hours**	**10**

Single Phase Transformers- Constructional Details-Types of transformers Hysteresis and Eddy Current Losses-EMF Equation - Operation on No Load and on Load - Phasor Diagrams. Equivalent Circuit - Losses and Efficiency-Regulation. All Day Efficiency - Effect of Variations of Frequency & Supply Voltage on Iron Losses.

Unit - IV	**TESTING OF TRANSFORMERS AND THREE PHASE INDUCTION MOTORS**	**Lecture Hours**	**14**

OC and SC Tests - Sumpner's Test - Separation of Losses Test-Parallel Operation of transformers with Equal and Unequal Voltage Ratios - Auto Transformers-Equivalent Circuit.

Three-Phase Induction Motors:

Polyphase Induction Motors-Constructional Details of Cage and Wound Rotor Machines-Production of Rotating Magnetic Field - Principle of Operation –Slip - Rotor Parameters at Standstill and under running conditions –Power flow diagram- Applications

Unit - V	**TESTING AND SPEED CONTROL METHODS OF 3-PHASE INDUCTION MOTOR**	**Lecture Hours**	**08**

Torque Equations – Torque-Slip Characteristic – Equivalent Circuit - Phasor Diagram - Crawling and Cogging- -Circle Diagram-No Load and Blocked Rotor Tests-Predetermination of Performance, Starting methods and speed control of induction motor.

Text Books:

1.	Electrical Machinery, P.S. Bimbhra, Khanna Publishers, 7th Edition, 2011
2.	Theory and performance of Electrical Machines, J.B.Gupta, Kataria, S. K.& Sons Publications.

Reference Books:

1.	The Performance and Design of Direct Current Machines, A.E. Clayton and N. N. Hancock, ELBS Publishers, First published 1927, First Edition of e-book 2012.
2.	Electrical Machines, S K Bhattacharya, McGraw Hill Education (India) Pvt. Ltd., 4th Edition, 2014, 3rd Reprint 2015.
3.	Electric Machinery, A.E.Fitzgerald, C.Kingsley and S. Umans, McGraw Hill Education (India) Pvt. Ltd., 6th Edition, 2005.
4.	Electric Machines 4th edition, D.P.Kothari and I.J. Nagrath, McGraw Hill Education (India) Pvt. Ltd., 4th Edition, 2010, 16th Reprint 2015.
5.	Electrical Machines, AshfaqHussain,DhanpatRai & Co, 2nd Edition, 2005
6.	Electrical Machines, R.K.Rajput, Laxmi Publications,5th Edition.2008
7.	Electrical Technology, B.L. Theraja and A.K.Theraja, S.Chand Publications,Volume-II,2006.
8.	NPTEL Online

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Title of the Course :	**ELECTRO MAGNETIC FIELDS**			
Branches for which this course is offered:	**III Semester**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview:
The primary objective of this course is to introduce the concepts of electric field and magnetic field and their effect on various applications. Various types of Maxwell's equations along with Amperes circuital law will be dealt in detail. The combined effect of electric field and magnetic field on a wave propagating through a medium will also be studied.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the behavior of static magnetic fields in standard configurations by applying vector calculus.
CO2	Apply vector calculus to generalize the behavior of static electric fields in standard configurations.
CO3	Analyze the inductance and capacitance for different structures.
CO4	Apply basic laws of electric, magnetic and electromagnetic fields to find force.
CO5	Analyze the effect of time varying fields involving both electric and magnetic field on a wave propagating through a medium along analysis of with modified Maxwell's equations for time varying fields.
CO6	Use of modern tool MATLAB to simulate electromagnetic fields of transmission lines.

Course Content:			
Unit - I	**INTRODUCTION TO COORDINATE SYSTEMS AND ELECTRO STATIC FIELDS**	**Lecture Hours**	**14**
Cartesian, cylindrical and spherical coordinate systems. Differential length, area and volume. Line, surface and volume integrals. Del operator, gradient of a scalar, divergence of a vector and divergence theorem. Curl of a vector and Stokes Theorem. Electrostatic Fields- Coulomb's Law- Definition of Electric Field Intensity (EFI) and Applications of EFI-Work done in moving a point charge in an electrostatic field- Electric Potential- due to point charges, line charges and volume charges- Potential gradient- Gauss's law - Application of Gauss's Law- Maxwell's first law. Laplace's and Poison's equations-Electric dipole- Dipole moment- potential and EFI due to an electric dipole- Torque on an Electric dipole in a electric field.			
Unit - II	**CONDUCTORS , DIELECTRICS AND CAPACITANCE**	**Lecture Hours**	**10**
Behaviour of conductors in an electric field- Conductors and Insulators- Electric field inside a dielectric material- polarization- Dielectric – Conductor and Dielectric- Dielectric boundary conditions – Capacitance- Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – Conduction and Convention current densities – Ohm's law in point form – Equation of continuity.			
Unit - III	**STATIC MAGNETIC FIELDS AND FORCE IN MAGNETIC FIELDS**	**Lecture Hours**	**12**
Biot-Savart's law in vector form ,Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, solenoid current Carrying wire –Maxwell"s second			

Equation, div(B)=0. Ampere's circuital law and its applications– Point form of Ampere"s circuital law – Maxwell"s third equation, Curl (H)=J.
Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight, long current and two straight long and 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**	**Lecture Hours**	**10**

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 and mutual inductance between a straight, long wire and a square loop wire in the same plane – energy stored and density in a magnetic field-- Numerical Problems.

Unit - V	**MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVE PROPAGATION**	**Lecture Hours**	**11**

Faraday's laws of electromagnetic induction – Integral and point forms – Maxwell's fourth equation. Statically and dynamically induced E.M.F's – Simple problems – 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 Theorem and Poynting vector.

Text Books:

1. Engineering Electromagnetics, William.H.Hayt, Mc.Graw Hill, 2010.
2. Electromagnetic Fields, S.Sivanagaraju ,C.Srinivasa Rao (2008), New Age publications.

References Books:

1. Field Theory, K.A. Gangadhar, Khanna Publications, 2003.
2. Electromagnetics 5th edition, J.D.Kraus, Mc.Graw – Hill Inc, 1999.
3. Electromagnetics, Joseph Edminister, Tata Mc Graw Hill, 2006
4. Principles of Electromagnetics, 6th Edition, Sadiku, Kulkarni, OXFORD University Press, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**ELECTRICAL CIRCUITS – II**			
Branches for which this course is offered:	**III Semester**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview:
The primary objective of this course is to give the fundamentals of electric circuit analysis equivalents. It introduces analyzing of transient and steady state characteristics of circuits for DC and AC excitation. The emphasis of this course is laid on the basic analysis of circuits which includes three phase circuits, Fourier Transforms and filters.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Analyze three phase balanced and unbalanced circuits and determine line voltages, line currents, phase voltages and phase currents
CO2	Measure active and reactive power consumed by a given three phase circuit
CO3	Determine the transient response of R-L, R-C, R-L-C circuits for D.C and A.C excitations
CO4	Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources
CO5	Design different types of filters.

Course Content:

Unit - I	**TRANSIENT RESPONSE ANALYSIS**	**Lecture Hours**	**10**

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 - II	**POLY PHASE CIRCUITS**	**Lecture Hours**	**12**

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. Single wattmeter and two wattmeter method.

Unit - III	**GRAPH THEORY**	**Lecture Hours**	**12**

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks. Super Node and Super Mesh for D.C Excitations.

Unit - IV	FOURIER TRANSFORMS	Lecture Hours	12
Fourier Theorem- Trigonometric Form and Exponential Form of Fourier Series – Conditions of Symmetry- Line Spectra and Phase Angle Spectra- Analysis of Electrical Circuits excited by Non Sinusoidal sources of Periodic Waveforms. Fourier Integrals and Fourier Transforms – Properties of Fourier Transforms and Application to Electrical Circuits.			
Unit - V	**FILTERS**	**Lecture Hours**	**12**
Filters – Low Pass, High Pass, Band Pass and Band stop filters – RC, RL filters, Constant K filters, m derived filters and composite filter design.			

Text Books:	
1.	Electrical Circuit Theory and Technology, John Bird, ELSEVIER, 4th Edition, 2010.
2.	Network Analysis, M.E Van Valkenburg, Pearson Education, 3rd Edition, 2015.
References Books:	
1.	Circuit Theory (Analysis & Synthesis), A. Chakrabarti, DhanpatRai& Co.,6th Edition, 2008.
2.	Electric Circuits by N.Sreenivasulu, REEM Publications Pvt. Ltd., 2012
3.	Engineering circuit analysis by William Hayt, Jack E. Kemmerly and Steven M. Durbin, McGrawHill Education (India) Pvt. Ltd., 6th Edition, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**ELECTRONIC DEVICES AND CIRCUITS**			
Branches for which this course is offered:	**III Semester (EEE&ECE)**	**L**	**T**	**C**
		4	**0**	**4**

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

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

Course Content:			
Unit – I	**PN DIODE CHARACTERISTICS**	**Lecture Hours**	**12**
PN diode – Operation, biasing, characteristics, equation, static and dynamic resistance. Effect of temperature on VI characteristics of a diode, ideal vs practical diode, diode equivalent circuits. **Special Diodes:** Zener diode, Tunnel diode, LED, Photo diode– construction, operation and Characteristics.			
Unit – II	**RECTIFIERS & FILTERS**	**Lecture Hours**	**10**
Block diagram of regulated power supply, Half wave rectifier, Full wave rectifier and Bridge rectifier, characteristics of rectifiers and comparison of rectifier circuits. Filters – Derivation of ripple factor for Inductor, Capacitor, L-section and Π section filters, Zener diode as a voltage regulator.			
Unit – III	**TRANSISTOR CHARACTERISTICS (BJT & FET)**	**Lecture Hours**	**08**
BJT: Structure and principle of operation, Transistor as an amplifier, Transistor configurations (CE, CB, CC), input and output characteristics. **FET:** Construction, operation and characteristics of JFET and MOSFET.			
Unit – IV	**TRANSISTOR BIASING**	**Lecture Hours**	**09**
DC & AC load line, criteria for fixing operating point, factors affecting operating point, Methods of biasing– fixed bias, self-bias, collector to base bias, stability factors (S, S', S''). Thermal runaway, condition for thermal stability.			
Unit – V	**ANALYSIS OF TRANSISTOR AMPLIFIER AT LOW FREQUENCY**	**Lecture Hours**	**09**
BJT: Analysis of CE, CB and CC amplifiers using exact and approximate h-parameter model. **FET:** Analysis of CS and CD amplifiers.			

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Title of the Course :	**ELECTRICAL MACHINES-I LAB**		
Branches for which this course is offered:	**III Semester**	**P**	**C**
		3	**1.5**

Course Overview:
The objective of the DC Machine Lab is to expose the students to the operation of DC machines and give them experimental skill. It also aims to understand the generation of DC voltages by using different types of generators and study their performance and enable the students to understand the working principles of DC motors and their load characteristics, starting and methods of speed control. Further it helps to familiarize with the constructional details of different types of DC generators, DC motors working principle and their performance.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Evaluate the open circuit characteristics in order to find the critical resistance, speed and also list out the external and internal characteristics of dc shunt machines.
CO2	Perform the load test and brake test on DC shunt generator and motor in order to determine the performance characteristics.
CO3	Determine the efficiency of DC shunt and series machines through fields test and Hopkinson's test respectively.
CO4	Predetermine the efficiency of DC shunt motor by conducting Swinburne's test.
CO5	Draw the characteristics of DC series generator by conducting load test and also carry out the separation of losses in DC shunt motor
CO5	Analyze the performance curves of DC compound motor by conducting brake test on the motor

List of Experiments:

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 load characteristics
4. Load test on DC Series generator. Determination of load characteristics.
5. Load test on DC Compound generator. Determination of load 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 efficiency.
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 Shunt motor.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**ELECTRICAL CIRCUITS AND SIMULATION LAB**		
Branches for which this course is offered:	**III Semester**	**P**	**C**
		3	**1.5**

Course Overview:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is the various electric circuit concepts through circuit simulation using PSPICE software, performance of RLC series and parallel circuits through simulation studies, the analysis of 3-phase balanced and unbalanced circuits by simulation, the occurrence of transients in electric circuits with both DC and AC excitations.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Explain electric circuit concepts by interpreting the simulation results
CO2	Design RLC series circuit for specified frequency response
CO3	Analyze three phase balanced and unbalanced circuits
CO4	Design RL, RC and RLC circuits for specified transient response
CO5	Design and Frequency Response of Low Pass and High Pass

List of Experiments:

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 and Frequency Response of Low Pass and High Pass Filters

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course	**ELECTRONIC DEVICES AND CIRCUITS LABORATORY**		
Branch for which this course is offered	**III Semester (ECE & EEE)**	**P**	**C**
		3	**1**

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

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

List of Experiments:

1. **Electronic Workshop Practice** :Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. **Electronic Workshop Practice**: Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO
3. P-N Junction Diode Characteristics
4. Zener Diode Characteristics
5. Zener Diode as a Voltage Regulator
6. Half-wave Rectifier without and with C-filter
7. Full-wave Rectifier without and with C-filter
8. BJT Characteristics (CE Configuration)
9. BJT Characteristics (CB Configuration)
10. FET Characteristics(CS Configuration)
11. Transistor Biasing
12. CE Amplifier

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course	**VERBAL ABILITY AND LOGICAL REASONING**		
Branch for which this course is offered	**III Semester (ECE & EEE)**	**L**	**C**
		1	**1**

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

Course Content:			
UNIT – I	**CODING AND DECODING**	**Lecture Hours**	**03**
Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out			
UNIT – II	**ARTICLES AND TENSES, DIRECTION SENSE**	**Lecture Hours**	**03**
a)Articles and Tenses: Introduction, usage of articles, Omission of Articles, Types of tenses, Forms and Usage of tenses b)Direction Sense: Introduction, Distance method, Facing Method and Shadow Method			
UNIT – III	**BLOOD RELATIONS, VOICES AND FORMS OF SPEECH**	**Lecture Hours**	**03**
a) Blood Relations: Introduction, Direct, Puzzle and Coded models b) Voices and Forms of Speech: Introduction, conversion of active and passive voice, conversions of direct and indirect speech.			
UNIT – IV	**DATA ARRANGEMENTS, SYLLOGISMS**	**Lecture Hours**	**04**
a) Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements b) Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method			
UNIT – V	**VISUAL REASONING, SENTENCE CORRECTION**	**Lecture Hours**	**03**
a) Visual Reasoning: Patterns, Folded Images, Cubes and Analytical Reasoning b) Sentence Correction: Subject-Verb Agreement, Pronoun Antecedent, Parallelism, Verb-Time Sequence Error, Determiners and Modifiers			

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

B.Tech-IV SEMESTER

S.No	Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal	External	Total
1	**A1210**	Electrical Machines – II	**PC**	3	1	0	4	30	70	100
2	**A1211**	Control Systems	**PC**	3	1	0	4	30	70	100
3	**A1212**	Power Systems-I	**PC**	4	0	0	4	30	70	100
4	**A1414**	Linear and Digital Integrated Circuit Analysis	**ES**	3	0	0	3	30	70	100
5	**A1701**	Managerial Economics & Financial Analysis	**HS**	3	0	0	3	30	70	100
6	**A1213**	Control Systems and Simulation Lab	**PC**	0	0	3	1.5	30	70	100
7	**A1214**	Electrical Machines – II Lab	**PC**	0	0	3	1.5	30	70	100
8	**A1415**	Linear and Digital Integrated Circuit Analysis Lab	**ES**	0	0	2	1	30	70	100
9	**A1012**	Quantitative Aptitude-I	**BS**	1	0	0	1	30	70	100
10	**A1215**	Comprehensive Online Examination-I	**PW**	0	0	0	1	-	100	100
TOTAL				**19**	**02**	**08**	**24**	**270**	**730**	**1000**

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Title of the Course :	**ELECTRICAL MACHINES-II**			
Branches for which this course is offered:	**IV Semester**	**L**	**T**	**C**
		3	**1**	**4**

Course Overview:
The objectives of the course are to make the student learn about the construction and principle of working of different connections of three phase transformers and synchronous machines, different methods of predetermining the regulation of alternators, the concepts and computation of load sharing among alternators in parallel. The performance characteristics of synchronous motors and their use as synchronous condensers for power factor improvement. Different types of single phase motors and special motors used in house hold appliances and control systems.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Identify the three phase transformers employed in distribution and transmission system based on their connections.
CO2	Understand the construction and principle of operation of round rotor and salient pole machines along with E.M.F Equation.
CO3	Determine experimentally the characteristics of synchronous generator along with phasor diagram and also evaluate the regulation by synchronous impedance method, M.M.F method and Z.P.F method
CO4	Interpret the parallel operation of synchronous generators and determination of sub-transient, transient and steady state reactance's
CO5	Explain the principle of operation of synchronous motor along with V and Inverted V curves and also describe the concept of hunting and methods of starting in synchronous induction motor
CO6	Infer the constructional features of single phase motor along with double revolving field theory and elementary idea of cross-field theory. Carry out a detailed analysis on special motors which include A.C series motor, universal motor and stepper motor.

Course Content:			
Unit - I	**THREE PHASE TRANSFORMERS**	**Lecture Hours**	**10**
Three phase transformer connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ, Third harmonics in phase voltages Three-winding transformers-tertiary windings, Scott connection, Numerical Problems.			
Unit - II	**3-PHASE ALTERNATORS**	**Lecture Hours**	**10**
Principle and Constructional Features of Salient Pole and Round Rotor Machines – Windings and Factors – E.M.F Equation - Armature Reaction – Synchronous Reactance and Impedance – Load Characteristics - Phasor Diagram- Applications.			
Unit - III	**REGULATION AND PARALLEL OPERATION OF ALTERNATORS:**	**Lecture Hours**	**12**
Regulation of Salient Pole Alternator – Voltage Regulation Methods, Two Reaction Theory – Determination of Xd and Xq (Slip Test) – Phasor Diagrams. Power Flow Equation in Alternators (Cylindrical and Salient Pole Machines) – Synchronizing Power and Torque – Parallel Operation and Load Sharing – Effect of Change of Excitation and			

Mechanical Power Input – Synchronizing Alternator with Infinite Bus Bars .			
Unit - IV	**3- PHASE SYNCHRONOUS MOTORS**	**Lecture Hours**	**10**
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- Applications.			
Unit - V	**SINGLE PHASE INDUCTION MOTORS**	**Lecture Hours**	**12**
Single Phase Induction Motors - Constructional Features – Double Revolving Field Theory- Elementary Idea of Cross Field Theory – Split Phase Motors – Capacitor Start and Run Motors – Shaded Pole Motor. Principle and Performance of A.C Series Motor - Universal Motor-Stepper Motor- Applications.			

Text Books:	
1.	1. Electrical Machinery, P.S. Bimbhra, Khanna Publishers, 7th Edition, 2011.
2.	Electric Machines 4th edition, D.P.Kothari and I.J. Nagrath, McGraw Hill Education (India) Pvt. Ltd., 4th Edition, 2010, 16th Reprint 2015.
References Books:	
1.	Electrical Machines, AshfaqHussain,DhanpatRai & Co, 2nd Edition, 2005.
2.	Electrical Machines, R.K.Rajput, Laxmi Publications,5th Edition.2008.
3.	Electrical Technology, B.L. Theraja and A.K.Theraja, S.Chand Publications,Volume-II,2006.
4.	Theory of Alternating Current Machinery, Alexander S.Langsdorf, Tata McGraw-Hill, 2nd edition, 1999, 35th Reprint.
5.	A Textbook of Electrical Machines, K R Siddhapura and D B Raval, Vikas Publishing House Pvt. Ltd., 2014.
6.	Theory and performance of Electrical Machines, J.B.Gupta, Kataria, S. K.& Sons Publications.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course:	**CONTROL SYSTEMS**			
Branches for which this Course is offered:	**IV Semester (EEE & ECE)**	**L**	**T**	**C**
		3	**1**	**4**

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

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

Course Content:			
Unit - I	**MODELING OF PHYSICAL SYSTEMS**	**Lecture Hours**	**10**
Types of control systems- Examples-Comparisons- characteristics of feedback systems, Mathematical modeling and differential equations of physical systems, concept of transfer function, translational and rotational mechanical systems, electrical systems, force, voltage and force, current analogy.			
Unit -II	**BLOCK DIAGRAM REDUCTION TECHNIQUES AND TIME RESPONSE ANALYSIS**	**Lecture Hours**	**12**
Block diagram representation of various systems - Signal flow graph, Mason's gain formula. Transfer Function of DC Servo motor - Characteristics of AC Servo motor - Synchro transmitter and Receiver. Time response analysis: Standard test signals, shifted unit step, impulse response, unit step response of first and second order systems, time response specifications, steady state errors and error constants, dynamic error coefficients method, Effects of proportional, derivative and proportional derivative, proportional integral and PID controllers.			

Unit-III	**CONCEPT OF STABILITY AND ROOT LOCUS TECHNIQUE**	**Lecture Hours**	**12**
Introduction to stability Necessary and sufficient conditions for stability, Routh's and Routh Hurwitz stability criterions and limitations. Root locus technique: Introduction, root locus concept, construction of root loci, graphical determination of 'k' for specified damping ratio, relative stability, effect of adding zeros and poles on stability.			
Unit-IV	**FREQUENCY DOMAIN ANALYSIS AND COMPENSATORS**	**Lecture Hours**	**10**
Frequency domain analysis: Introduction, frequency domain specifications, stability analysis from Bode plot, Nyquist plot, calculation of gain margin and phase margin, determination of transfer function, correlation between time and frequency responses Compensators: Lag, lead, lead - lag networks.			
Unit-V	**STATE SPACE ANALYSIS**	**Lecture Hours**	**12**
State Space Analysis: Concept of state, state variables and state model, derivation of state models from block diagrams, diagonalization, solving the time invariant state equations, state transition matrix and properties, concept of controllability and observability			

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

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course :	**POWER SYSTEMS - I**			
Branches for which this course is offered:	**IV Semester**	**L**	**T**	**C**
		4	**0**	**4**

Course Overview:
The primary objective of this course is to represent how electrical power plays a significant role in day to day life of entire mankind. The course introduces the principles and concepts involved in power generation. The course concerns the generation of conventional and non-conventional sources of energy. The course deals with the process involved in power generation in thermal, hydro and nuclear power stations and also due to various types of non-conventional sources like solar, wind, biogas, geothermal and ocean. The course also deals with the economic aspects of power generation and different tariff methods.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Recognize the importance of power generation and difference between renewable and non-renewable energy sources, recall the process of nuclear fission and chain reaction.
CO2	Analyze the construction, working and operating principle, and essential components of various power generating stations with their relative merits and demerits.
CO3	Design the layout and select the optimal location for different power plants along with its relevant features.
CO4	Analyze the different methods and characteristics of solar, wind, biogas, geothermal and ocean power generating systems along with their economic and environmental aspects.
CO5	Carry out a detailed analysis on the economic aspects of power generation involving various tariff methods and costs of generation.

Course Content:			
Unit - I	**STRUCTURE OF POWER SYSTEMS &THERMAL POWER STATIONS**	**Lecture Hours**	**10**
Structure of Power Systems: Components of an electric power system - Overview of conventional and non-conventional sources of energy, Single line diagram of electrical power system, important terms & factors. Base load and peak load on power station. **Thermal Power Station**: Line Diagram of Thermal Power Station (TPS) showing paths of Coal, Steam, Water, Air, Ash and Flue Gases - TPS Components: Economizers, Boilers, Super Heaters, Turbines, Condensers, Chimney and Cooling Towers.			
Unit - II	**HYDRO ELECTRIC POWER & NUCLEAR POWER STATIONS**	**Lecture Hours**	**14**
Hydro Power Station: Elements of hydroelectric power station, types, concept of pumped storage plants, mass curve and estimation of power developed from a given catchment area, heads and efficiencies. Hydraulic turbines: Classification of turbines, impulse and reaction turbines,			

Pelton wheel, Francis turbine and Kaplan turbine

Nuclear Power Station: Nuclear Fission and Chain Reaction.- Nuclear Fuels.- Principle of Operation of Nuclear Reactor.-Reactor Components: Moderators, Control Rods, Reflectors and Coolants.- Radiation Hazards: Shielding and Safety Precautions.- Types of Nuclear Reactors and Brief Description of PWR, BWR and FBR.

Unit - III	**PV GENERATION& WIND POWER MILLS**	**Lecture Hours**	**14**

PV 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 Mills :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	**BIOGAS, GEOTHERMAL& OCEAN POWER PLANTS**	**Lecture Hours**	**14**

Biogas Power Plant: Principles of Bioconversion, Types of Biogas Digesters – Characteristics of Bio-Gas- Utilization- Economic and Environmental Aspects.

Geothermal and Ocean Power Plants: Principle of Geothermal Energy Methods of Harnessing-Principle of OTEC-Tidal Plants and Wave Energy Plants- Mini Hydel Plants-Economic Aspects.

Unit - V	**ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF METHODS**	**Lecture Hours**	**12**

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. Methods of determining Depreciation-Tariff Methods: Desirable Characteristics of a Tariff Method- Flat Rate, Block-Rate, Two-Part, Three –Part, and Power Factor Tariff Methods and Numerical Problems.

Text Books:

1.	A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, DhanpatRai& Co. Pvt. Ltd., 1999.
2.	Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.

References Books:

1.	Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.
2.	Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3.	Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.
4.	Wind Electrical Systems by S. N. Bhadra, D. Kastha& S. Banerjee – Oxford University Press, 2013.
5.	Non Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.

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Title of the Course :	**LINEAR AND DIGITAL INTEGRATED CIRCUIT APPLICATIONS**			
Branches for which this course is offered:	**IV Semester (EEE)**	**L**	**T**	**C**
		3	**0**	**3**

Course Overview:
Integrated circuit is electronics and this course IC applications acquaints the students with general analog principles and design methodologies using practical devices and applications. It focus on process of learning about signal condition, signal generation, instrumentation, timing and control using various IC circuitry. 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. This course focuses on analysis, design and applications of modern digital integrated circuits.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the internal operation of Op-Amp and its specifications.
CO2	Operate 555 timer in different modes like monostable and astable operations and study their applications and discuss about various DAC and ADC techniques
CO3	Analyze and design applications like filters using Op-Amp and discuss about oscillators.
CO4	Apply basic switching concepts for realizing logic circuits.
CO5	Analyze and design combinational and sequential circuits.
CO6	Write VHDL code for any type of logic circuit.

Course Content:			
Unit - I	**OP-AMP CHARACTERISTICS & APPLICATIONS-I**	**Lecture Hours**	**16**
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, trans-conductance and trans-resistance converters, S&H circuits, analog multiplier and divider, Differentiator and Integrator, Comparators, Schmitt trigger.			
Unit - II	**OP-AMP APPLICATIONS-II:**	**Lecture Hours**	**10**
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, waveform generators- triangular, saw tooth and square wave.			
Unit - III	**OP-AMP APPLICATIONS-III :**	**Lecture Hours**	**11**
555 timer – Introduction, Functional diagram of IC-555, modes of 555 timer - operation and applications, Schmitt Trigger. **PLL –** Introduction, Schematic diagram, principles and description of individual blocks of analog			

IC565.

D-A and A-D Converters – Basic concept of DAC, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, various types of ADCs – Parallel comparator type ADC, Counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC specifications.

Unit - IV	**BINARY SYSTEMS AND GATE LEVEL MINIMIZATION**	**Lecture Hours**	**11**

Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, The Map Method, Four Variable Map, Don't-Care Conditions, NAND and NOR Implementation.

Unit - V	**COMBINATIONAL & SEQUENTIAL CIRCUITS**	**Lecture Hours**	**12**

Combinational: Code converters, Decoders, Demultiplexers, Seven segment display. Encoder, priority Encoder, Multiplexers & their analysis, priority generators/checker circuits. Digital arithmetic circuits- binary adder/subtractor circuits using 2"s Complement system. 4-bit comparator circuit.

Sequential: Latches, Flip-flops & their conversions.Design of synchronous counters, Decade counter, shift registers & applications.

Text Books:	
1.	Linear Integrated Circuits – D.Roy Chowdhury, New Age International (p) Ltd,2nd Edition., 2003.
2.	Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
3.	Digital Design, M.Morris Mano & Micheal D. Ciletti, Pearson, 5th Edition, 2013.
References Books:	
1.	Operational Amplifiers & Linear Integrated Circuits: Theory & Applications –Denton J.Daibey,TMH.
2.	Op-amps & Linear ICs – Ramakanth A.Gayakwad, PHI, 1987
3.	Digital Logic Design, R.D. Sudhakar Samuel, Elsevier

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Title of the Course	**CONTROL SYSTEMS AND SIMULATION LAB**		
Branches for which this Course is offered:	**IV Semester**	**P**	**C**
		3	**1.5**

Course Overview:
The objective of this lab is to make the student practically learn about • The effects of feedback on system performance • Determination of transfer functions of DC Machine. • The design of controllers/compensators to achieve desired specifications. • The characteristics of servo mechanisms used in automatic control applications

COURSE OUTCOMES:	
After Successful Completion of this course, the student will able to	
CO1	Design the controllers/compensators to achieve desired specifications.
CO2	Understand the effect of location of poles and zeros on transient and steady state behavior of systems.
CO3	Assess the performance, in terms of time domain specifications, of first and second order systems.
CO4	Understand the concepts of PLC and develop the PLC programs
CO5	Use MATLAB/SIMULINK software for control system analysis and design.

List of Experiments:

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. Lag and Lead Compensation-Magnitude and Phase Plot
8. Temperature Controller Using PID
9. Characteristics of Magnetic Amplifiers
10. Characteristics of AC Servomotor
11. PSPICE Simulation of Op-Amp Based Integrator and Differentiator Circuits
12. Linear System Analysis (Time Domain Analysis, Error Analysis) Using MATLAB
13. Stability Analysis (Bode, Root Locus, Nyquist Plot)of Linear Time Invariant System Using MATLAB
14. State Space Model for Classical Transfer Function Using MATLAB-Verification.
15. Step Response of a State Model
16. Impulse Response of a State Model

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Title of the Course :	**ELECTRICAL MACHINES-II LAB**		
Branches for which this course is offered:	**IV Semester**	**P**	**C**
		3	**1.5**

Course Overview:
The Primary objective of the Lab is to make the student learn about conducting the different tests on single phase transformers and three phase induction motors to determine the performance and efficiency, which are used in power transmission systems and industrial areas and also students able to learn about various tests are conducted on three phase synchronous machines to determine the regulation of alternator and its characteristics.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Conduct suitable tests on single phase transformer and pre determine the efficiency and regulation at different loading conditions.
CO2	Perform the regulation of alternator by EMF and MMF methods in order to evaluate voltage regulation at different power factors.
CO3	Carry out No load and blocked rotor tests on three phase induction motor to determine efficiency and also to draw the performance characteristics.
CO4	Analyze the equivalent circuit diagrams of single phase induction motor by conducting various tests.
CO5	Conduct the brake test on 3 phase induction motors and evaluate the performance characteristics
CO6	Convert 3 phase to 2 phase connection in 3 phase transformer through Scott connection

List of Experiments:

1. O.C & S.C Test on Single Phase Transformer
2. Sumpner's Test on a Pair of Identical Single Phase Transformers
3. Scott Connection of Transformers
4. No load and Blocked Rotor Tests on Three Phase Induction Motor
5. Regulation of Three Phase Alternator By Synchronous Impedance & M.M.F Methods
6. No load and Blocked Rotor Test on Single Phase Induction Motor
7. Determination of X_d & X_q of a Salient Pole Synchronous Machine
8. V and Inverted V Curves of Three Phase Synchronous Motor.
9. Separation of core losses of a single phase Transformer
10. Brake Test on Three Phase Induction Motor

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Title of the Course :	**LINEAR AND DIGITAL INTEGRATED CIRCUIT APPLICATIONS LAB**		
Branches for which this course is offered:	**IV Semester**	**P**	**C**
		3	**1**

Course Overview:
The objective of the Linear and Digital IC Analysis lab is to expose the students to design the analog and digital ICs and give them experimental skill. It also aims to understand the generation of various shapes of signals and study their performance and enable the students to understand the working of Analog and Digital ICs and their applications.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Study the closed-loop Op-amp configurations.
CO2	Generate sinusoidal, triangular & square waveform using op-amp.
CO3	Design and verify the frequency response of the filters using TL082 Op – Amp.
CO4	Design and draw the internal structure of various logic gates.
CO5	Implement Combinational circuits using VHDL source code.
CO5	Develop VHDL source code and perform simulation.

List of Experiments:

1. Design and analyze (a) Unity gain amplifier.
   (b) Non – Inverting amplifier.
   (c) Inverting amplifier
2. Instrumentation amplifier configurations with three op-amps.
3. Frequency response of practical Integrator.
4. Frequency response of practical differentiator.
5. Astable multivibrator using 555 timer.
6. Design and analyze the responses of Function generator.
7. Design and plot the frequency response of low pass and high pass filter.
8. R-2R Ladder Digital to Analog Converter.
9. Realization of logic gates.
10. 3X8 Decoder – 74138.
11. 8X1 Multiplexer – 74151.
12. 4 – bit Comparator – 7485.
13. D – Flip-flop – 7474.
14. Shift Registers - 7495

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Title of the Course:	**QUANTITATIVE APTITUDE -1**		
Branches for which this course is offered:	**IV Semester**	**L**	**C**
		1	**1**

Course Content:			
Unit – I	**RATIO AND PROPORTION, AVERAGE, MIXTURES AND ALLEGATION**	**Lecture Hours**	**04**
Ratio and Proportion: Ratio, Proportion, Variations, Problems on Ages **Average, Mixtures and Allegation**: Averages, Weighted average, Difference between mixture and allegation, Problems on Mixtures and allegation			
Unit – II	**PERCENTAGES,SI& CI, DATA INTERPRETATION**	**Lecture Hours**	**03**
Percentages,SI& CI: Fundamentals of Percentage,Percentage change, SI and CI,Relation between SI, CI **Data Interpretation:** Introduction,Tabulation, Bar Graph, Pie Charts, Line Graphs,Combined Graphs.			
Unit -III	**PROFIT AND LOSS, PARTNERSHIPS, LOGARITHMS**	**Lecture Hours**	**03**
Profit and loss, Partnerships: Basic terminology in profit and loss, Types of partnership, Problems related to partnership **Logarithms:** Fundamental formulae of logarithms and problems, finding no of terms on expanding a given number.			
Unit- IV	**PERMUTATION AND COMBINATION**	**Lecture Hours**	**03**
Permutation and combination: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to numbers, Circular permutation, Combination			
Unit –V	**CLOCKS AND CALENDAR**	**Lecture Hours**	**03**
Clocks: Introduction, Finding angle between hands of clock, Gain/Loss of Time, Finding time, Gain or loss of time **Calendar:** Calendars method- 1,Calendars method -2			

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

COURSE STRUCTURE

V – SEMESTER

PROGRAMMECURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

V SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1218	Power Systems-II	PC	3	1	0	4	30	70	100
A1219	Power Electronics	PC	3	1	0	4	30	70	100
A1220	Electrical Measurements and Instrumentation	PC	3	0	0	3	30	70	100
A1424	Digital Electronics	PC	3	0	0	3	30	70	100
	Professional Elective – 1	PE	3	0	0	3	30	70	100
	Open Elective – 1	OE	3	0	0	3	30	70	100
A1221	Power Electronics Laboratory	PC	0	0	3	1.5	30	70	100
A1222	Electrical Measurements and Instrumentation Laboratory	PC	0	0	3	1.5	30	70	100
A1016	Advanced English Language Communication Skills	MC	2	0	0	0	100*	-	100*
		TOTAL	20	02	06	23	240	560	800

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

COURSE STRUCTURE

A1218 – POWER SYSTEMS-II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	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. A1203 - Electrical Circuits – I
2. A1206- Electro Magnetic Fields
3. A1212 - Power Systems – I

2. Course Outcomes (COs)

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

A1218.1 Apply the knowledge of electromagnetic fields to calculate the parameters of transmission lines and underground cables.

A1218.2 Analyze the performance of various transmission lines, underground cables and overhead insulators.

A1218.3 Design mechanical transmission lines using corona phenomenon, Sag and Tension.

A1218.4 Analyse 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 Heights of 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, typesoffaults, protection. Protective Devices - Fuses, Circuit Autoreclosers, line sectionalizers and circuit breakers.

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

A1219 – POWER ELECTRONICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	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

A1401-Electronic Devices and Circuits

2. Course Outcomes (COs)

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

A1219.1 Illustrate the fundamental concepts and techniques used in power electronic circuits.

A1219.2 Analyze the performance and protection techniques of power electronic devices.

A1219.3 Analyze the operation and performance of AC-DC, DC-DC, DC-AC and AC-AC converters.

A1219.4 Design a suitable power electronic converter circuit for given applications.

A1219.5 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 Cyclo-converters: 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1220 -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	30	70	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different electrical measuring instruments used to measure electrical quantities. 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. A1203-Electrical Circuits -I
2. A1207-Electrical Circuits-II

2. Course Outcomes (COs)

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

A1220.1 Categorise various electrical instruments used for measuring electrical parameters.

A1220.2 Analyze the errors and compensations in various electrical measuring instruments

A1220.3 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.

A1220.4 Estimate the unknown quantities of resistance, inductance and capacitance using bridges

A1220.5 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

A1424– DIGITAL ELECTRONICS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2.Course Outcomes (COs)

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

A1424.1 Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.

A1424.2 Make use of k-map and tabulation methods to minimize boolean functions and to implement with logic gates.

A1424.3 Analyze basic components used in digital systems such as adder and subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters

A1424.4 Distinguish combinational and sequential logic in terms of their functions.

A1424.5 Design various PLDs such as ROMs, PALs, PLAs and PROMs.

3. Course Syllabus

UNIT-I

Digital systems and binary numbers

Review of number systems and their conversions, Representation of negative numbers, binary codes, and Hamming code.

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

UNIT-II

Gate level minimization

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

UNIT-III

Combinational logic

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

UNIT-IV

Sequential logic

Memory elements and their excitation functions SR, JK, T, and D latches and flip-flops, master slave JK flip-flop, analysis and design of clocked sequential circuits, state minimization and assignment.

Registers and counters, registers, classification of registers, bidirectional shift register, design of ripple counters, synchronous counters, ring counter, twisted ring counter.

UNIT-V

Memory and programmable logic

Types of memories, SRAM, DRAM, ROM, memory decoding, programmable logic array, programmable array logic, and concept of Programmable logic devices like FPGA, Logic implementation using programmable devices.

4. Books and Materials

Text Book(s)

1.M. Morris Mano,MichaelD.Ciletti,*Digital Design*,4th edition,Pearson Education/PHI, India, 2008.

2.Thomas.L.Floyd 2006, *Digital fundamentals*, 9th edition, Pearson Education International, 2006.

Reference Book(s)

1.Zvi.Kohavi, *Switching and Finite Automata Theory*, Tata McGraw Hill, India, 2004.

2.C.V.S. Rao, Switching and Logic Design, 3rd edition, Pearson education, India, 2009.

COURSE STRUCTURE

A1221 – 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	30	70	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. A1402 Electronic Devices and Circuits Laboratory
2. A1219 Power Electronics

2. Course Outcomes (COs)

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

A1221.1 Analyze the performance characteristics of SCR firing and commutation circuits.

A1221.2 Plot the performance characteristics of AC-DC, DC-AC, DC-DC and AC-AC converters with R and RL Loads.

A1221.3 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.

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COURSE STRUCTURE

A1222 – 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	30	70	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. A1202 - Electrical Circuits-I
2. A1207- Electrical Circuits-II
3. A1220 - Electrical Measurements and Instrumentation

2. Course Outcomes (COs)

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

A1222.1 Estimate resistance, inductance and capacitance of electrical circuits using bridges and dielectric strength of transformer oil

A1222.2 Calculate the percentage error of various measuring instruments, LVDT, and resistance strain gauge

A1222.3 Evaluate 3-Φ active power and reactive power of different loads.

A1222.4 Calibrate single phase energy meter and DC Crompton potentiometer.

3. Course Syllabus

1. Kelvins 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. Kelvins 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.

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COURSE STRUCTURE

A1016-ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS

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

1. Course Description

Course Overview

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

Course Pre/co requisites

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

2. Course Outcomes (COs)

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

A1016.1	Build inferences and predictions based on the information provided in the context.
A1016.2	Choose academic vocabulary appropriately both in speaking and in writing.
A1016.3	Develop effective technical writing skills.
A1016.4	Construct necessary skills to deliver presentation confidently for improving in respective domains.
A1016.5	Apply language structures to construct good relations.

3. Course Syllabus

UINT – I

Communication Skills:

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

UINT – II

Writing Skills:

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

UINT – III

Presentation Skills:

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

UINT – IV

Getting Ready for Job:

1 Debates 2 Group discussions 3 Job Interviews

UINT – V

Interpersonal Skills:

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

4. Books and Materials

Text Books

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

Reference Books

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

COURSE STRUCTURE

VI – SEMESTER

VI SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1223	Power Semiconductor Drives	PC	3	0	0	3	30	70	100
A1224	Computer Methods in Power Systems	PC	3	1	0	4	30	70	100
A1427	Microprocessors and Microcontrollers	PC	4	0	0	4	30	70	100
	Professional Elective – 2	PE	3	0	0	3	30	70	100
	Professional Elective – 3	PE	3	0	0	3	30	70	100
A1225	Power Systems Simulation Laboratory	PC	0	0	3	1.5	30	70	100
A1429	Microprocessors and Microcontrollers Laboratory	PC	0	0	3	1.5	30	70	100
A1529	Python Programming Laboratory	PC	0	0	4	2	30	70	100
A1226	Comprehensive Online Examination-II	PW	0	0	0	1	-	100	100
A1015	Human Values and Professional Ethics	MC	2	0	0	0	100*	-	100*
	TOTAL		18	01	10	23	240	660	900

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

COURSE STRUCTURE
A1223 – 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	30	70	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

A1219 - Power Electronics
A1205 - Electrical Machines-I
A1210 - Electrical Machines-II

2. Course Outcomes (COs)

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

A1223.1 Identify a suitable electric drive system for desired application.

A1223.2 Apply 1-phase & 3- phase controlled converters for speed control operation of DC drives.

A1223.3 Apply the knowledge of DC-DC Converter and dual converter for speed and torque control of DC Drives.

A1223.4 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 of D.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.

COURSE STRUCTURE

A1224 – POWER SYSTEM ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	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

A1203 - Electrical Circuits – I
A1207 - Electrical Circuits – II
A1218 - Power Systems – II

2. Course Outcomes (COs)

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

A1224.1 Apply computational methods to determine transmission line parameters.

A1224.2 Apply load flow methods to examine the load flow studies.

A1224.3 Analyze symmetrical and unsymmetrical power system faults.

A1224.4 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,*Tata McGraw-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

A1427 – MICROPROCESSORS AND MICROCONTROLLERS

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

1. Course Description

Course Overview

This course 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

A1424 - Digital Electronics

2. Course Outcomes (COs)

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

A1427.1 Analyze 8086 microprocessor and MSP430 microcontroller architectures

A1427.2 Develop programs using 8086 microprocessor and MSP430 microcontroller

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

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

A1427.5 Design embedded applications using MSP430 microcontroller

3. Course Syllabus

UNIT-I

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

UNIT-II

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

UNIT-III

MSP430 Microcontroller: Low power 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*, 3rd edition, TMH publications

2. John H. Davies,*MSP430 microcontroller basics,* 1st edition, Newnes publication, 2008

Reference Book(s)

1. N. Senthil Kumar, M. Saravanan and S. Jeevanathan,*Microprocessor and Microcontrollers,* 1st edition, Oxford publishers, 2010

2.Lyla B. Das.*The X86 Microprocessors, Architecture, Programming and Interfacing,* Pearson publications, 2010

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COURSE STRUCTURE

A1230 – 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	30	70	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

A1224 - Computer methods in Power Systems

2. Course Outcomes (COs)

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

A1230.1 Develop a program to simulate Ferranti effect

A1230.2 Develop a program to model transmission lines

A1230.3 Develop a program for formation Y-Bus and Z-Bus

A1230.4 Develop a program for load flow solution

A1230.5 Develop a program for short circuit analysis

A1230.6 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.

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COURSE STRUCTURE

A1429 – MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

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

1. Course Description

Course Overview

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

Course Pre/Corequisites

1. A1424 – Digital Electronics
2. A1427 – Microprocessors and Microcontrollers

2. Course Outcomes (COs)

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

A1429.1 Develop assembly language programs using EMU8086 emulator.

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

A1429.3 Build programs of MSP430 using embedded C.

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

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

3. Course Syllabus

PART A: List of Assembly Language Programs using 8086 Microprocessor

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

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

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

7. Using ULP advisor in Code Composer Studio on MSP430
8. Low Power modes and Energy trace++: Compute Total Energy, and Estimated lifetime of an AA battery.

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Reference Books

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

Other References

1. https://www.tutorialspoint.com/assembly_programming/assembly_tutorial.pdf
2. https://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

A1529 – 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

The aim of this course is to provide practical experience in using Python language. This course covers python data type, control statements, data structures, functions, modules, file handling and exception handling concepts. It helps the student in selecting a domain path leading to Artificial intelligence, Data Science or IoT.

Course Pre/Corequisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A1529.1 Apply fundamental programming concepts of python for solving general purpose problems

A1529.2 Implement sequences to solve complex problems

A1529.3 Build functions to increase code reusability

A1529.4 Implement modular programming for organized software development

A1529.5 Make use of exception handling for robust programming.

3. Course Syllabus

1. **Basics and Operations**

a) Running instructions in Interactive interpreter and a Python Script.

b) Write a program to purposefully raise Indentation Error and correct it.

c) Write a program to compute distance between two points taking input from the user.

2. **Control Flow**

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.

c) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

d) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

3. **Data Structures**

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure.

b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

c) Write a program combine lists that combines these lists into a dictionary.

d) Write a program to count frequency of characters in a given file.

4. **Functions**

a) 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.

b) Write a function dups to find all duplicates in the list.

5. **Functions - Problem Solving**

a) Write a function cumulative product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

6. **Multi-Dimensional Lists**

a) Write a program to perform addition of two square matrices.

b) Write a program to perform multiplication of two square matrices.

c) Write a program to perform multiplication of two square matrices.

7. **Modules**

a) Install packages requests, flask and explore them. using (pip).

b) Write a script that imports requests and fetch content from the page. Eg.(Wiki).

c) Write a simple script that serves a simple HTTP Response and a simple HTML Page.

8. **Files**

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.

9. Exception Handling

a) Write a python program to use Exception handling to catch divided by zero and divided by power of 2 exceptions.

b) Write a python program to use exception handling to prevent the calculation of roots of quadratic equation if root as complex.

4. Laboratory Equipment/Software/Tools Required Software's:

Python

5. Books and Materials

Text Book(s)

1. Ashok NamdevKamthane, Amit Ashok Kamthane,*Programming and problem solving with python.* McGraw-Hill education, 2018.

Reference Book(s)

1. Martin C. Brown, *The Complete Reference: Python.* McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, *Fundamentals of Python*. CENGAGE, 2015.

COURSE STRUCTURE

A1015 – HUMAN VALUES &PROFESSIONAL ETHICS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

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

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

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

A1015.4 Make useof the fundamental rightsand human rights in life for individual dignity.

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

3. Course Syllabus

UNIT-I

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

channels of youth moments for national building - NSS & NCC, philosophy, aims & objectives; emblems, flags, mottos, songs, badge etc. roles and responsibilities of various NSS functionaries. Nehru yuva Kendra (NYK), activities – socio cultural and sports.

UNIT-II

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

UNIT-III

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

Environment issues, conservation, enrichment and sustainability, climate change, waste management, natural resource management (rain water harvesting, energy conservation, waste

land development, soil conservations and a forestation). Health, hygiene & sanitation, health education, food and nutrition, safe drinking water, sanitation, swatch bharatabhiyan.

UNIT-IV

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

UNIT-V

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

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

4. Books and Materials

Text Book(s):

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

Reference Book(s)

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

PROFESSIONAL ELECTIVES

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

Professional Electives:

Professional Elective – 1	
Course Code	**Title of the Course**
A1251	Special Electrical Machines
A1252	Utilization of Electrical Energy
A1253	Advanced Control Theory
A1254	Solar Energy and its Applications

Professional Elective – 2	
Course Code	**Title of the Course**
A1255	Hybrid Electric Vehicles
A1256	Electrical Distribution and Automation
A1257	Fundamentals of Signals and Systems
A1258	Wind Energy and its Applications

Professional Elective – 3	
Course Code	**Title of the Course**
A1259	Machine Modeling and Analysis
A1260	High Voltage Engineering
A1261	Digital Control Systems
A1262	Smart Grid Technology

Professional Elective – 4	
Course Code	**Title of the Course**
A1263	Switched Mode Power Converters
A1264	EHVAC Transmission
A1265	Digital Signal Processing
A1266	Reliability Engineering in Renewable Energy Sources

Professional Elective – 5/MOOCs	
Course Code	**Title of the Course**
A1267	Introduction to Battery Management
A1268	HVDC Transmission
A1269	Industrial Automation and Control
A1270	AI Techniques in Power Systems

COURSE STRUCTURE

A1251 – 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	30	70	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 switched reluctance motors, stepper motors, permanent magnet dc 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. A1203 - Electrical Circuits-I
2. A1205 - Electrical Machines-I
3. A1210 - Electrical Machines-II

2. Course Outcomes (COs)

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

A1251.1 Analyse the performance of switched reluctance motors, stepper motors, permanent magnet dc motors linear motors and servo motors

A1251.2 Deduce the emf and torque equations of stepper motor, servo motor, reluctance motor and BLDC motor.

A1251.3 Apply speed control techniques for switched reluctance motors, stepper motors,Permanent magnet dc motors linear motors and servo motors.

A1251.4 Plot the characteristics of switched reluctance motors, stepper motors,Permanent magnet dc motors linear motors and servo motors.

3. Course Syllabus

UNIT-I

Stepper Motor: Introduction, variable reluctance stepper motor, permanent magnet stepper motor, hybrid stepper motor,windings in stepper motors, torque equation, characteristics of stepper motor, open – loop control of stepper motor, closed – loop control of stepper motor, applications of stepper motor.

Switched Reluctance Motors: Construction, principle of working, basics of SRM analysis, constraints on pole arc and tooth arc, torque equation and characteristics, power converter circuits, control of SRM, rotor position sensors, current regulators, sensor less control of SRM.

Permanent magnet DC (PMDC) motor, Brushless permanent magnet DC (BLDC) Motors.

UNIT-III

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-IV

Single Phase Special Electrical Machines: Repulsion motor, hysteresis motor, single phase reluctance motor.

Servo Motors: DC servo motors, AC servo motors.

UNIT-V

Linear Electrical Machines: Linear induction motor, linear synchronous motor, DC linear motor, linear reluctance motor, linear levitation machines.

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

COURSE STRUCTURE

A1252 –UTILISATION OF ELECTRICAL ENERGY

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

1. Course Description

Course Overview

The purpose of this course is to enable the student to acquire knowledge on the utilization of electrical energy. This course deals with the fundamentals of illumination, laws of illumination, classification, application for various lighting schemes, electric heating and welding. Here the concepts of electric traction, study of traction equipment, mechanics of train movement and associated calculations are discussed. This courseis helpful in designing of traction systems.

Course Pre/co requisites

1. A1205 - Electrical Machines-I
2. A1210 - Electrical Machines-II

2. Course Outcomes (COs)

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

A1252.1 Analyse various illumination systems, heating and welding techniques.

A1252.2 Analyse the torque- speed characteristics, speed-time characteristics and specific energy consumption of electric locomotive

A1252.3 Apply suitable braking technique to control the speed locomotive.

A1252.4 Apply the power factor improvement and load factor improvement techniques for effective usage of electrical energy.

3. Course Syllabus

UNIT-I

Illumination: Definition–laws of illumination–polar curves – calculation of MHCP and MSCP. lamps: incandescent lamp, sodium vapour lamp, fluorescent lamp, CFL and LED. Requirement of good lighting scheme – types, design and calculation of illumination. Street lighting and factory lighting.

UNIT-II

Electrical heating & welding: Methods of electric heating – resistance, arc, induction and dielectric heating and its applications.

Electric welding: Types – resistance, electric arc, gas welding. ultrasonic, welding electrodes of various metals, defects in welding.

Electrolysis - faraday's laws, applications of electrolysis, power supply for electrolysis.

UNIT-III

Electric Traction – I: Introduction –traction systems, systems of electric traction- advantages of electric traction, special features of traction motors - the locomotive – wheel arrangement and riding qualities – transmission of drive – characteristics and control of locomotives - systems of track electrification – dc equipment – ac equipment – electric braking with dc motors and with ac motors – control gear – auxiliary equipment – track equipment and collector gear – conductor-

rail equipment – overhead equipment – calculation of sags and tensions – collector gear for overhead equipment.

UNIT-IV

Electric Traction – II: Types of services – urban – sub-urban and main line services, speed-time curves of different services – trapezoidal and quadrilateral speed-time curves – tractive effort, power, specific energy consumption- factors affecting specific energy consumption, mechanics of train movement - adhesive weight and coefficient of adhesion.

UNIT-V

Economic aspects of utilising electrical energy: Power factor improvement, load factor improvement, off peak loads- use of exhaust steam, waste heat recovery, pit head generation, diesel plant, general comparison of private plant and public supply- initial cost and efficiency, capitalization of losses, choice of voltage.

4. Books and Materials

Text Book(s)

1. E. Openshaw Taylor and V. V. L. Rao, *Utilization of Electric Energy*, Universities press, 2009
2. J.B. Gupta, *Utilization of Electric Power and Electric Traction,* Kataria and sons, Delhi.

Reference Book(s)

1. C.L Wadhwa, *Generation, Distribution and Utilization of Electrical Energy*, Wiley eastern limited, 1993.
2. R.K. Rajput, *Utilization of Electrical Power*, Laxmi publications.

COURSE STRUCTURE

A1253 – 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	30	70	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. A1211 -Control Systems
2. A1009 -Mathematics-II

2. Course Outcomes (COs)

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

A1253.1	Develop the mathematical model of linear/non-linear systems in state space.
A1253.2	Investigate the controllability/observability of a given system.
A1253.3	Analyze stability of linear / Non-linear systems using various methods.
A1253.4	Design state feedback controller and optimal controller for a given system.
A1253.5	Evaluate 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 Lyapunov's instability theorems. Direct method of lyapunov 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.

COURSE STRUCTURE

A1254 – SOLAR ENERGY AND ITS APPLICATIONS

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

1. Course Description

Course Overview

With the increasing demand of utilization of electrical power, Solar Energy and its applications has become an important subject. This course deals with solar energy technologies, solar radiations, measurement of solar radiations, solar energy measuring instruments and solar collector plates. The concepts of Photo Voltaic cells, methods to store solar energy and environmental issues concerned with solar systems will be covered in this course. The course will help in designing and minimizing the losses in a grid connected system to improve Power System Stability.

Course Pre/co requisites

A1212 - Power Systems – I

2. Course Outcomes (COs)

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

A1254.1 Demonstrate the usage of solar energy for different electrical equipment's.

A1254.2 Apply the principles of solar radiation to generate electrical energy.

A1254.3 Analyze the thermal properties of solar energy collectors.

A1254.4 Classify the methods to measure solar radiation and store solar energy.

A1254.5 Analyze the economic aspects and environmental issues related to solar system.

3. Course Syllabus

UNIT-I

Principles of solar radiation: Role and potential of renewable source, environmental impact of solar power, physics of the sun, solar constant, extraterrestrial and terrestrial solar radiation.

Measurement of solar radiation: solar energy measuring instruments – pyranometer pyrheliometer– sunshine recorder - estimation of average solar radiation - ratio of beam and total radiation on tilted surface of that on horizontal surface.

UNIT-II

Solar energy collectors: Flat plate collector – materials – thermal analysis and useful heat gained by the fluid-fin efficiency - collector efficiency factor – heat removal factor - types of concentrating collectors.

Photo voltaic cell: Fundamentals of solar cells, types of solar cells, semiconducting materials, bandgap theory, absorption of photons, excitations and photo emission of electrons, band engineering.

UNIT-III

PV cell properties: Solar cell properties and design, p-n junction photodiodes, depletion region, electrostatic field across the depletion layer, electron and holes transports, device physics, charge carrier generation, recombination and other losses, i-v characteristics, output power.

Storage of solar energy: Types of energy storage - thermal storage - electrical storage - chemical storage - hydro-storage.

UNIT-IV

Applications of solar energy: Solar water heater-natural circulation solar water heater- forced circulation solar water heater.solar street light, solar pump set, solar distillation and drying.roof top solar power generation.

UNIT-V

Cost analysis and environmental issues: Cost analysis and pay back calculations for different types of solar panels and collectors, installation and operating costs, environmental and safety issues, protection systems, performance monitoring.

4. Books and Materials

Text Book(s)

1. G D Rai, *Non- Conventional Energy Resources,* Khannapublishers, 1st edition, 2002.
2. Mukund R Patel, *Wind and Solar Power Systems,* CRC Press, 1st edition, 1999.

Reference Book(s)

1. ArindamGhosh, Gerard Ledwich, *Power Quality Enhancement Using Custom Power Devices,* Springer, 1st edition, 2002.
2. Roger C Dugan, Mark E Mc. Granaghan, SuryaSantosoh and H. Wayne Beaty, *Electrical Power Systems Quality,* Tata McGraw hill, 2nd edition, 2010.

COURSE STRUCTURE

A1255 – ELECTRICAL AND HYBRID 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	30	70	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:

A1205-Electrical Machines-I
A1210-Electrical Machines-II
A1219-Power Electronics

2. Course Outcomes (COs)

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

A1255.1 Analyze the topologies used for design of hybrid electric vehicles.

A1255.2 Apply the concepts of power electronics & drives to control hybrid electric vehicles

A1255.3 Analyze power flow control and various energy storage components used for hybrid electric vehicles

A1255.4 Demonstrate different configurations, techniques and sizing of components used in hybrid electric vehicles

A1255.5 Apply the Various energy management strategies in hybrid electric vehicles.

3. Course Syllabus

UNIT-I

Introduction: Conventional Vehicles, Basics of vehicle performance, vehicle power source characterization, transmission characteristics and mathematical models to describe vehicle performance. History of electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II

Hybrid Electric Drive-Trains: Basic concept of hybrid traction, introduction to various hybrid drive train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT-III

Electric Propulsion Unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives.

UNIT-IV

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, analysis of battery based energy storage, Fuel Cell based energy storage, Super Capacitor based energy storage and flywheel based energy storage, Hybridization of different energy storage devices.

Sizing the Drive System: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, selecting the energy storage technology, Communications, supporting subsystems.

UNIT-V

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of 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. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, *Modern Electric, Hybrid Electric, and Fuel Cell Vehicles*: Fundamentals, Theory, and Design, CRC press, 2004.
2. IqbalHussain, *Electric & Hybrid Vehicles – Design Fundamentals*, Second Edition, CRC press, 2011.
3. James Larminie, *Electric Vehicle Technology Explained*, John Wiley & sons, 2003.

COURSE STRUCTURE

A1256–ELECTRICAL DISTRIBUTION AND AUTOMATION

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the power system distribution and importance of automation. The objective of this course is to introduce the three-phase electrical distribution systems, Electrical load characteristics, Electric circuit calculations, Distribution economics, Distribution system planning, Distribution equipment, functions of distribution automation, technical benefits and evaluation process. This course is applied in managing reactive power, equipment maintenance for substation and grid integration of distributed energy resources.

Course Pre/co requisites

1. A1212-Power Systems – I

2. A1216-Power Systems – II

2. Course Outcomes (COs)

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

A1256.1 Categorize the different types of distribution system, feeders and loads.

A1256.2 Compare the voltage drop and power loss for various distribution systems.

A1256.3 Design a substation layout with optimal location.

A1256.4 Analyze the methods for power factor correction.

A1256.5 Apply the knowledge of Distribution automation and SCADA in Energy management systems operations.

3. Course Syllabus

UNIT-I

Load Modelling and Characteristics: Introduction to distribution systems, load modelling and characteristics. Coincidence factor, contribution factor, loss factor - relationship between the load factor and loss factor. Classification of loads (residential, commercial, agricultural and industrial) and their characteristics.

UNIT-II

Classification of Distribution Systems: classification of distribution systems - comparison of DC vs AC and undergrounds over-head distribution systems- design of primary & secondary distribution systems. Voltage drop calculations in A.C. distributors - power factors referred to receiving end voltage and their respective load voltages**.**

UNIT-III

Substations: Location of substations: rating of distribution substation, service area with 'n' primary feeders, optimal location of substations, classification of substations, substations layout.

bus bar arrangements in the sub-stations: single bus bar, sectionalized single bus bar, main & transfer bus bar, double breaker – one and half breaker system.

UNIT-IV

Power factor improvement: causes of low p.f -methods of improving p.f -phase advancing and generation of reactive KVAR using static capacitors-most economical p.f. for constant KW load and constant KVA type loads.

Capacitive compensation for power-factor control - effect of shunt capacitors (fixed and switched), power factor correction- economic justification - procedure to determine the best capacitor location.

UNIT-V

Distribution Automation: Distribution Automation (DA) – project planning – definitions – communication – sensors-supervisory control and data acquisition (SCADA) – consumer information service (CIS) –geographical information system (GIS) – automatic meter reading (AMR) – automation systems.

4. Books and Materials

Text Book(s)

1. TuranGonen,*Electric Power Distribution system Engineering*, 5th edition, Tata McGraw hill book company, New Delhi
2. A.S.Pabla (2004), *Electric Power Distribution*, 5th edition, Tata McGraw hill education, New Delhi.

Reference Book(s)

1. S.Sivanagaraju,V. Sankar*, Electrical Power Distribution and Automation*,1st edition,DhanpatRai&Co, New Delhi, India,2006.
2. S.Sivanagaraju, S. Satyanarayana, *Electric Power Transmission and Distribution*,1st edition, Pearson education india, New Delhi,2008
3. Kamalesh Das, *Electrical Power Systems for Industrial Plants*, JAICO publishing house, 2008.

COURSE STRUCTURE

A1257 – FUNDAMENTALS OF SIGNALS AND SYSTEMS

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

1. Course Description

Course Overview

This is an introductory course to signal processing and communication engineering.This course deals with classification of signals and systems in continuous and discrete time domains. The Fourier, Laplace and Z-transform representation of signals and systems are also covered in detail. This course will provide an opportunity to learn about different signals and systems by using different transforms in continuous and discrete time domains.

Course Pre/corequisites

1. A1002 Mathematics – I
2. A1014 Linear Algebra and Complex Variables

2. Course Outcomes (COs)

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

A1257.1 Distinguish between different signals and systems.

A1257.2 Make use of Fourier series for the representation of signals.

A1257.3 Analyze different signals by using an appropriate transform.

A1257.4 Select an appropriate transform to find the transfer function of the system.

A1257.5 Analyze the system stability in different domains.

3. Course Syllabus

UNIT-I

Classification of Signals: Continuous time and discrete time, analog and digital, periodic and aperiodic, energy and power, even and odd, causal and non-causal, deterministic and random, concepts of unit impulse, step, ramp and parabolic signals.

Operations on Signals: Time shifting, time scaling, time reversal and combined operations.

UNIT-II

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

UNIT-III

Fourier Analysis of Continuous Time Signals and Systems: Trigonometric Fourier series, Exponential Fourier series. Fourier transform of continuous time signals, finding the response of continuous time system by using Fourier transform.

Fourier Analysis of Discrete-Time Signals and Systems: Fourier series representation of discrete time signals, Discrete Time Fourier Transform (DTFT), solving the difference equations using DTFT.

UNIT-IV

The Laplace Transform: Relation between Laplace and Fourier transform, forward and inverse transform, region of convergence, solution of differential equations using Laplace transform with initial conditions, natural response, forced response, stability analysis in s-domain.

UNIT-V

The Z-transform: Relation between DTFT and Z-transform, z-transform of different sequences, inverse z-transform, solution of difference equations using z-transform with initial conditions, stability analysis in z-domain.

4. Books and Materials

Text Book(s)

1. A.V. Oppenheim, A.S.Willsky and S.H. Nawab, *Signals and Systems*, Pearson, 2nd edition, 2014.
2. A. AnandKumar, *Signals and systems*, PHI learning, 2nd edition 2012.

Reference Book(s)

1. Simon Haykin and Van Veen, *Signals& Systems*, Wiley, 2nd edition, 2007.
2. B.P. Lathi, *Signals, Systems & Communications*, BS publications, 2009.

COURSE STRUCTURE

A1258 –WIND ENERGY AND ITS APPLICATIONS

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

1. Course Description

Course Overview

With the increased demand of power utilization, Wind Energy and its applications has become an important subject. This course deals with the generations of electrical power from wind energy. Here the concepts of modelling of wind turbine and the types of wind turbines are discussed. The engineering aspects of windpower systems, aerodynamic analysis, wind field analysis and monitoring systems are covered in this course. The course will help in designing and minimizing the losses in a grid connected system to improve Power System Stability.

Course Pre/corequisites:

1. A1003 - Engineering Physics
2. A1004 - Engineering Chemistry
3. A1212 - Power Systems – I
4. A1218 - Power Systems – II

2. Course Outcomes (COs)

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

A1258.1 Apply various measurement techniques to determine the atmospheric and design boundaries of wind turbines.

A1258.2 Apply a suitable turbine model to generate electrical energy from wind energy.

A1258.3 Analyse the parameters of aerodynamics, DRC/PMG Generator and AC drive connected wind turbines.

A1258.4 Apply suitable control and monitoring mechanism for wind energy systems.

3. Course Syllabus

UNIT-I

Wind Energy Fundamentals & Wind Measurements: History of wind energy, wind energy basics, wind speeds and scales, terrain, roughness, wind mechanics, power content, class of wind turbines, atmospheric boundary layers, turbulence. instrumentation for wind measurements, wind data analysis, tabulation, wind resource estimation, Betz's limit, turbulence analysis, measurement of wind - anemometer & wind vane.

UNIT-II

Aerodynamics Theory & Wind Turbine Types: Air foil terminology, blade element theory, blade design, rotor performance and dynamics, balancing technique (rotor & blade), vertical axis type, horizontal axis, constant speed constant frequency, variable speed variable frequency, up wind, down wind.

UNIT-III

Direct Rotor Coupled Generators : Excited rotor synchronous generator / PMG generator, control rectifier, capacitor banks, step up / boost converter (DC-DC step up), grid tied inverter, power management, grid monitoring unit (voltage and current).

UNIT-IV

Modern Wind Turbine Control & Monitoring System: Details of pitch system & control algorithms, wind turbine monitoring with error codes.

UNIT-V

SCADA and Databases: Remote monitoring and generation reports, operation & maintenance for product life cycle, balancing technique (rotor & blade), FACTS control & LVRT & new trends for new grid codes.

4. Books and Materials

Text Book(s)

1. Paul Gipe, *Wind Energy Comes of Age*, John Wiley & sons inc, 1995.
2. Ahmed *Wind Energy Theory and Practice*, PHI, eastern economy edition, 2012

Reference Book(s)

1. Tony Burton et al, *Wind energy Hand Book*, John wiley& sons inc.
2. Directory, *Indian Wind Power* 2004, CECL, Bh

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COURSE STRUCTURE

A1259 – MACHINE MODELING AND ANALYSIS

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the student about the design of electrical machines. This course deals with the basics of various fundamentals, Transformation to an arbitrary reference frame and enables them to be acquainted with machine design. The analysis of electrical machines discussed in this course will be useful to identify a suitable machine for a given application.

Course Pre/corequisites:

1. A1206- Electro Magnetic Fields
2. A1205-Electrical Machines-I
3. A1210- Electrical Machines-II

2. Course Outcomes (COs)

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

A1259.1 Apply the principles of electrical machines in their design and modelling.

A1259.2 Evaluate the Voltage and Torque Equation of DC and AC Machines.

A1259.3 Differentiate the performance of machines using reference frame theory.

A1259.4 Analyze the dynamic modelling and steady state behaviour of various electrical Machines**.**

3. Course Syllabus

UNIT-I

Basic Principles of Machine Analysis: Review of basic concepts, magnetizing inductance, principle of electromagnetic energy conversion, machine windings & air gap MMF, winding inductance and voltage equations

Modelling of DC machine: Introduction, voltage and torque equations, types of dc machines, dynamic characteristics of dc machines and solutions, time domain block diagrams and state equations.

UNIT-II

Analysis of Permanent Magnet Brushless D.C. Machine: Introduction to PMBL D.C. machine, voltage and torque equations in machine variables, analysis of steady state operations.

UNIT-III

Reference frame theory: Introduction to transformations, equations of transformations, change of variables, and transformation to an arbitrary reference frame, commonly used reference frames, transformation between reference frames, steady-state phasor relationships and voltage equations.

UNIT-IV

Modelling of Induction Machines: Introduction, voltage and torque equations in machine variables, equation of transformation for rotor circuits, voltage & torque equations in arbitrary reference frame variables, per unit system, analysis of steady state equations, free acceleration characteristics viewed from various reference frames, dynamic model and analysis for sudden change in load torque, dynamic model & analysis during three phase fault at the machine terminals, unbalanced operation at symmetrical induction machines.

UNIT-V

Modelling of Synchronous Machines: Voltage & torque equations in machine variables, stator voltage equations in arbitrary reference frame variables, voltage equations in rotor reference frame variables-park's equation, torque equation, rotor angle and angle between rotors, per unit system, analysis of steady state operation, dynamic performance during a sudden change in input torque, dynamic performance during a three-phase fault at machine terminal.

4. Books and Materials

Text Book(s):

1.Paul.C.Krause,OlegWasynczuk and Scott D. Sudhoff, *Analysis of Electrical Machinery and Drive systems*, IEEE press, second edition 2002.

2. Krishnan, *Electric Motor Drives - Modeling, Analysis & control*, Pearson publications, First edition, 2002.

Reference Book(s):

1. S.Bimbra, *Generalized Theory of Electrical Machines*Khanna publications, Fifth edition - 1995.

2. Bimal K Bose, *Modern Power Electronics & AC Drives*, Pearson education, 2002

3.T.J.E Miller, *Brushless Permanent Magnet & Reluctance Motor Drives*clarendom press, Oxford.1989.

COURSE STRUCTURE

A1260 –HIGH VOLTAGE ENGINEERING

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

1. Course Description

Course Overview

The purpose of this course to familiarize the students about the application of electrical phenomena in various mediums at high voltage. This course deals with different mediums of insulation, break down of insulation, generation and measurement of high DC and AC voltage, testing of insulation under all types of conditions at high AC and DC voltages. This course helps in design of advanced high voltage equipment's for various industrial applications.

Course Pre/corequisites:

1. A1003 - Engineering Physics
2. A1004 - Engineering Chemistry
3. A1212 - Power Systems – I
4. A1218 - Power Systems – II
5. A1206 – Electro Magnetic Fields

2. Course Outcomes (COs)

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

A1260.1 Analyse the breakdown mechanisms of solids liquids and gases.

A1260.2 Design the insulation for power system components.

A1260.3 Analyse and calculate the circuit parameters involved in generation of high voltages.

A1260.4 Measure the alternating signals, impulse high voltage signals, dielectric loss and partial discharge.

3. Course Syllabus

UNIT-I

Introduction: Introduction to ac and dc impulse voltages and their use, problems in dealing with high voltages.

Breakdown in Gases: Elementary ideas on ionization by electron collision, townsend mechanism, townsend first and second ionization coefficients, paschen law, breakdown in non-uniform fields and corona discharges, vacuum breakdown mechanisms.

UNIT-II

Breakdown In Liquids: Fundamentals of insulating oils, conduction and breakdown in pure and commercial liquids.

UNIT-III

Breakdown in Solids: Fundamentals of solid insulating materials intrinsic, electromechanical and thermal breakdown, breakdown in simple and composite dielectrics, types of insulating

materials, temperature classification, factor affecting dielectric strength, insulation design of rotating machines, transformers, transmission lines, switch gear, etc.

UNIT-IV

Generation of High Voltages: Generation of high voltages, testing transformers in cascade, series resonant circuits and their advantages, half and full wave rectifier circuits, voltage doubler and cascade circuits, electrostatic generator, characteristics parameters of impulse voltages, single stage impulse generator circuits, multistage impulse generation circuits.

UNIT-V

Measurement of High Voltages: Measurement of direct, alternating and impulse voltages by electrostatic voltmeters, sphere gap, uniform field gap, ammeter in series with high voltage resistors and voltage divider non-destructive high voltage tests: loss in a dielectric and its measurement, dielectric loss measurement by Schering bridge, partial discharges at alternating voltages, external and internal partial discharges and discharge measurements.

4. Books and Materials

Text Book(s)

1. M.S.Naidu and V. Kamaraju,*High Voltage Engineering*, TMH Publications, 4th edition, 2009
2. E.Kuffel, W.S. Zaengl J. Kuffel, *High Voltage Engineering: Fundamentals*, Elsevier, 2nd edition, 2005

Reference Book(s)

1. C.L.Wadhwa, *High Voltage Engineering,*New age internationals (p) limited, 1997
2. RavindraArora, Wolfgang Mosch, *High Voltage Insulation Engineering,* Newage international (p) limited, 1995.

COURSE STRUCTURE

A1261 – DIGITAL 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	30	70	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. A1211 - Control Systems
2. A1009 -Mathematics –II

2. Course Outcomes (COs)

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

A1261.1 Apply the Sampling and reconstruction theory in A/ D & D/A Conversion.

A1261.2 Solve the given differential equations using Z- transforms.

A1261.3 Analyze the given discrete time system in frequency domain and Z domain.

A1261.4 Design a given discrete time system in Z – Plane and state space representation.

A1261.5 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 its 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.

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COURSE STRUCTURE

A1262 – SMART GRID TECHNOLOGY

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

1. Course Description

Course Overview

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. A1212 - Power Systems-I
2. A1218 - Power Systems-II
3. A1220 - Electrical Measurements & Instrumentation

2. Course Outcomes (COs)

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

A1262.1	Demonstrate the need of converting conventional grid to Smart Grid.
A1262.2	Assess the role of automation in Transmission and Distribution.
A1262.3	Apply Evolutionary Algorithms for the Smart Grid.
A1262.4	Analyse various Methods used for information security on smart grid
A1262.5	Analyse Voltage and Frequency control techniques in Micro Grids.

3. Course Syllabus

UNIT-I

Introduction to Smart Grid: Introduction to smart 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.

OPEN ELECTIVES

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R18 REGULATIONS

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

Open Electives

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

COURSE STRUCTURE
A1181 – BASIC CIVIL ENGINEERING

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

1. Course Description

Course Overview

This course is designed to impart the basic knowledge about civil engineering to the students of other branches of engineering. The course includes materials for construction, basic surveying and other basic concepts of irrigation, water supply and geotechnical engineering. It provides the significance of the civil engineering profession satisfying societal needs.

Course Pre/corequisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A1181.1 Classify various materials and components used in building construction

A1181.2 List out different domains like Structural, Transportation and Geotechnical Engineering in Civil engineering stream

A1181.3 Identify types of soils and foundations for various structures

A1181.4 Measure the linear and angular parameters using concepts of surveying

A1181.5 Develop water supply system for domestic and irrigational needs

3. Course Syllabus

UNIT I

Introduction to civil engineering & construction materials: Importance and scope of civil engineering, characteristics, types and their uses of stones, bricks, timber and cement

UNIT II

Survey and highway engineering: Definition and classification of surveying, linear and angular measurements, leveling-modern instruments

UNIT III

Modes of transportation: classification of highways - classification of pavements, curves, super elevation

UNIT IV

Geotechnical engineering: Origin of soil, types of soil, bearing capacity of soil, types of foundation, shallow and deep

UNIT V

Irrigation and water supply: Definition and classification of irrigation, irrigation structures, dams, weirs, cross drainage works, canal drops and quality of water-treatment methods

4. Books and Materials

Text Book(s)

1. B C Punmia, Ashok K Jain, Arun K Jain. *Basic Civil Engineering*, Laxmi Publications (P) Ltd,1st edition, 2003.
2. G K Hiraskar,*Basic Civil Engineering,* Dhanpat Rai Publication, 1st edition, 2004.

Reference Book(s)

1. K.R. Arora. *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Delhi, 7th edition 2014.
2. B C Punmia Lal,*Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi, 16th edition, 2005.
3. Abe Kruger,*Green Building*,5th edition, 2012.

COURSE STRUCTURE
A1182 – BUILDING PLANNING AND CONSTRUCTION

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

1. Course Description

Course Overview

The objective of the course is to learn about building by-laws laid by planning authorities, apply the principles and methods to be followed in constructing various components of abuilding & understand about masonry types in brick and stone construction. This course provides sequential approach towards constructional activities like flooring, carpentry, plumbing and electrical works etc.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1182.1 Plan buildings by adhering to laws laid by regulatory bodies

A1182.2 Classify different masonry types of brick and stones used in construction

A1182.3 Select appropriate floors and roofs for a proposed building

A1182.4 Identify building materials which can be employed in construction

A1182.5 Make use of damp proofing techniques to prevent ingress of water in buildings

3. Course Syllabus

UNIT I

Residential Buildings: Introduction, Different types of residential buildings- Detached house, Semi- detached house, Row house or chawls, Block of flats or terrace house, Duplex type houses, Selection of site for residential building, Factors effecting the selection of site, Components of building, By-laws and Regulations, Orientation of buildings-factors effecting orientation, C.B.R.I suggestions for obtaining optimum orientation.

UNIT II

Masonry: Stone Masonry-Definitions of terms used in masonry, Materials for stone masonry, Classifications of stone masonry, Dressing of stones. Brick Masonry- Introduction, Types of bricks, bonds in brick work, Comparison of brick masonry and stone masonry. Composite masonry-Introduction, Stone composite masonry, Brick-stone masonry, Concrete masonry, Hollow clay blocks masonry, Reinforced brick masonry.

UNIT III

Floors and Roofs: Ground Floor-Components of a floor, Materials used for floor construction, Different types of flooring, Upper floors- Introduction, Steel joist and stone or precast concrete Slab floor, Jack arch floors, Reinforced cement concrete floors, Ribbed or hollow tiled flooring, Precast concrete floors, Timber floors, Types of roofs- pitched roofs, Single roofs, Double or purlin roofs, Trussed roofs.

UNIT IV

Doors and Windows: Introduction, Frame, Shutters, Head, Sill, Horn, Rebate, Location of doors and windows, Size of doors and windows, Types of doors, Classifications of doors- Arrangement of components, Method or manner of construction, working Operations, Metal doors, Types of windows, Classifications of windows, Ventilators, Fixtures and fastenings, installing door and window frames.

UNIT V

Damp proofing: Introduction, causes of dampness on buildings, Effects of dampness on buildings, Precautions, Materials used for damp proofing, Methods of damp proofing, DPC treatment in building problems, Fire hazards, Fire resisting properties of common building materials.

4. Books and Materials

Text Book(s)

1. Kumara Swamy N &Kameswara Rao A, *Building planning and Drawing*, Charotar Publishers, 6th Edition, 1998
2. B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, *Building Construction*, Laxmi Publications, 10th Edition, 2008

Reference Book(s)

1. S.K. Duggal, *Building Materials*, New Age International Publishers, 4th Edition, 2010
2. D.N. Ghose, *Materials of construction*, Tata-McGraw-Hill Publishing Company Limited,1st Edition, 1989
3. Sushil Kumar Sushil Kumar, (2003), *Engineering Materials*, Metropolitan Book Co., Private Ltd., New Delhi.

COURSE STRUCTURE
A1183 – DISASTER MANAGEMENT

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

1. Course Description

Course Overview

This course provides knowledge on environmental hazards and disasters. The syllabus includes the basics of endogenous and exogenous hazards and gives a suitable picture on the different types of hazard and disasters. This course will enable the student to apply different management techniques to the hazards and disasters.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1183.1 Classify different kind of hazards/disasters and their effects on environment

A1183.2 Analyze the causes of hazards/disasters which effects human life

A1183.3 Apply disaster management through engineering applications

A1183.4 Apply suitable mitigation measures to minimize the effects of hazards and disasters

3. Course Syllabus

UNIT I

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

UNIT II

Types of Environmental hazards & Disasters: Types of Environmental hazards & Disasters: Natural hazards and Disasters, Man induced hazards & Disasters, Natural Hazards- Planetary Hazards/ Disasters, Extra Planetary Hazards/ disasters, Planetary Hazards- Endogenous Hazards – Exogenous Hazards.

UNIT III

Endogenous Hazards: Endogenous Hazards, Volcanic Eruption, Earthquakes, Landslides, Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes, Hazardous effects of volcanic eruptions, Environmental impacts of volcanic eruptions, Earthquake Hazards/ disasters, Causes of Earthquakes, Distribution of earthquakes, Hazardous effects of earthquakes, Earthquake Hazards in India, Human adjustment, perception & mitigation of earthquake.

UNIT IV

Exogenous hazards/ disasters: Exogenous hazards/ disasters, Infrequent events, Cumulative atmospheric hazards/disasters Infrequent events: Cyclones, Lightning, Hailstorms Cyclones: Tropical cyclones & Local storms, Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts, Cold waves, Heat waves. Floods: - Causes of floods, Flood hazards India, Flood control measures (Human adjustment, perception & mitigation). Droughts: - Impacts of droughts, Drought hazards in India, Drought control measures, Extra Planetary Hazards/ Disasters, Man induced Hazards /Disasters, Physical hazards/ Disasters-Soil Erosion

UNIT V

Soil Erosion: Mechanics & forms of Soil Erosion, Factors & causes of Soil Erosion, Conservation measures of Soil Erosion. Chemical hazards/ disasters, Release of toxic chemicals, nuclear explosion, Sedimentation processes. Sedimentation processes: - Global Sedimentation problems- Regional Sedimentation problems, Sedimentation & Environmental problems, Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion.

4. Books and Materials

Text Book(s)

1. Rajib Shah, *Disaster Management*, Universities Press, India, 2nd Edition, 2003
2. Tushar Bhattacharya, Disaster Science and Management, TMH Publications, 1st Edition, 2012

Reference Book(s)

1. Donald Hyndman & David Hyndman, *Natural Hazards & Disasters*, Cengage Learning, 4th Edition, 2013
2. R.B. Singh (Ed), *Disaster Management*, Rawat Publication, New Delhi, 1st Edition, 2006
3. Kates, B.I & White, *The Environment as Hazards*, G.F, Oxford Publishers, New York, 1978.

COURSE STRUCTURE
A1184 – WATER RESOURCES CONSERVATION

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

1. Course Description

Course Overview

This course introduces the great need to conserve and plan the water resources in more efficient way because of urbanization and depletion of water resources. The course content enables the students to learn water hydrology, importance of water conservation and methods to conserve water resources.

Course Pre/corequisites

The Course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1184.1 Interpret ground and surface water utilization for conservation of water resources

A1184.2 Apply the concepts of artificial ground water recharge to increase ground water level

A1184.3 Make use of the concepts of harvesting for preservation of water

A1184.4 Utilizenew technologies like ion exchange and UV radiation techniques to recycle and reuse waste water

A1184.5 Plan efficient use of water resources with minimum energy

3. Course Syllabus

UNIT I

Ground and surface water utilization- Hydrologic cycle, water budget, ground water level fluctuations and environmental influence.

UNIT II

Artificial ground water recharge- Concept and methods of artificial ground water recharge mounds & induced recharge, wastewater recharge for reuse, water spreading, farm ponds and percolation tanks.

UNIT III

Water harvesting- Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, and check dams

UNIT IV

Reuse & recycle of waste water-Types of reuse, application of treated waste water, purity of reclaimed water, guidelines and regulations, new technologies used in recycling of waste water.

UNIT V

Watershed management- Concept of watershed management, policies and decision making, Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

4. Books and Materials

Text Book(s)

1. Ramakrishnan S. *Ground water*, Sci -Tech Publications, 2nd edition, 2010.
2. B.C. Punmia& Pande B.B. Lal, *Irrigation and Water Power Engineering*; Laxmi Publications pvt. Ltd., New Delhi.

Reference Book(s)

1. S.N. Chatterjee, *Water Resources, Conservation and management*, Atlantic Publishers, 1st edition, 2018.
2. Murthy J.V.S, *Watershed Management*, New Age International Publishers, 2nd edition, 2017.
3. Murthy V.V.N*, Land and Water Management*, Kalyani Publications, 1st edition, 2018.

COURSE STRUCTURE
A1281 – FUNDAMENTALS OF ELECTRICAL ENGINEERING

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A1281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.

A1281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A1281.4 Test the Performance of DC machines, AC machines and single-phase transformers.

3. Course Syllabus

UNIT I

DC Circuits: Circuit Concept, Types of Network Elements, ohm's Law, types of Sources Voltage - Current Relationship for Passive element (R,L&C), Kirchhoff's Laws, Network Reduction Techniques: Series, Parallel, combination of Series and Parallel, Delta - Star Transformation, loop and Nodal Analysis.

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

UNIT II

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

UNIT III

D.C Generators: Constructional details of D.C. generator, Principle of Operation of D.C. generators, Types of D.C Generators, E.M.F Equation.

D.C Motors: Principle of Operation of DC Motors, Back emf, Torque Equation, Swinburne's test, speed control of DC motors by armature and field control methods.

UNIT IV

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

UNIT V

3-Phase Induction Motors: Principle of Operation, Types of induction motors, Slip, Torque equation, Torque-Slip characteristics.

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. A Sudhakar, Shyammohan S Palli, "*Circuits and Networks*", Tata McGraw-Hill, 4th edition.
2. D. C. Kulshreshtha," *Basic Electrical Engineering"*, McGraw Hill, 2009.
3. L. S. Bobrow, "*Fundamentals of Electrical Engineering"*, Oxford University Press, 2011.

COURSE STRUCTURE

A1282 – RENEWABLE ENERGY SOURCES

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

1. Course Description

Course Overview

The purpose of this course is to enable the student to acquire knowledge on various Power Generation Systems. The primary objective of this course is to introduce solar energy, its radiation, collection, storage and application. It also deals with production of quality of energy, types of generation plants and their principles of operation, methods of energy storage and economics of generation.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1282.1 Apply the principles of Renewable energy sources for the construction of Power generating station.

A1282.2 Analyze the various energy conversion systems and their limitations.

A1282.3 Analyze Renewable energy sources for various environmental conditions

A1282.4 Analyze the generation principles and operation of variety of sources of energy

3. Course Syllabus

UNIT I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT II

Solar Energy Collection, Storage & Applications: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Storage & Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT III

Wind Energy & Bio Mass: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

UNIT IV

Other Sources of Energy: Resources, types of wells, methods of harnessing the energy, potential in India. Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT V

Energy Storage and Economy: Energy Storage - Energy in Transportation - Magneto hydrodynamic Power Generation- Hydrogen Economy

4. Books and Materials

Text Book(s)

1. G.D. Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 4th edition 2008.
2. JhonTwidell and tony Weir, *Renewable Energy Resources*, 2nd edition, Taylor and Francis Group,2006.

Reference Book(s)

1. Twidell&Weir, *Renewable Energy Sources*, Tata McGraw Hill Education Private Limited, New Delhi, 4th edition 2009.
2. S. N. Bhadra, D. Kastha& S. Banerjee, *Wind Electrical Systems* – Oxford University Press,2013.

COURSE STRUCTURE

A1283 – ELECTRICAL MEASURING INSTRUMENTS

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

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different electrical measuring instruments used to measure electrical quantities. The minimization of different errors and their effects in measuring instruments are discussed. Here the concepts of single phase and three phase circuits are discussed to determine the voltage, current, power and energy. Also, the concepts of bridges are discussed, which are used for the measurement of unknown resistance, inductance and capacitance. These electrical measuring instruments are used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1283.1 Categorise various electrical instruments used for measuring electrical parameters.

A1283.2 Design appropriate arrangement for extension of range in measuring instruments.

A1283.3 Analyze the errors and compensations in various electrical measuring instruments

A1283.4 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.

A1283.5 Estimate the unknown quantities of resistance, inductance and capacitance using bridges

3. Course Syllabus

UNIT I

Measuring Instruments: Classification, deflecting, control and damping torques, Ammeters and Voltmeters,PMMC, moving iron and dynamometer type instruments, expression for the deflecting torque and control torque, Errors and compensations, extension of range using shunts and Series resistance.

UNIT II

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

UNIT III

Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer Wattmeter's', expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems.

UNIT IV

Measurement of Energy: Single phase induction type energy meter, driving and braking torqueserrors and compensations, testing by phantom loading. Three phase energy meters.

UNIT V

DC Bridges: Method of measuring low, medium and high resistance, Whetstone's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, loss of charge method, megger method.

AC Bridges: Measurement of Inductance, Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance, Desauty's Bridge, Schering Bridge.

4. Books and Materials

Text Book(s)

1. A.K. Sawhney, A course on Electrical and Electronics Measurements & Instrumentation, DhanpatRai and Co. Publishers, 19th edition, 2015.
2. J.B. Gupta, A course on Electrical and Electronics Measurements & Instrumentation, S.K. Kataria publishers, 14thedition, 2014.

Reference Book(s)

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

COURSE STRUCTURE

A1381 – OPTIMIZATION TECHNIQUES

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

1. Course Description

Course Overview

This course deals with modelling and optimization of the problems with limited resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

Course Pre/corequisites

The course has no specific prerequisite and Corequisite

2. Course Outcomes (COs)

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

A1381.1 Apply various Operations Research models and methods to real world problems.

A1381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A1381.3 Evaluate various alternatives available to find optimal solution for real world problems.

A1381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A1381.5 Decide the best operating policy for the efficient use of resources.

3. Course Syllabus

UNIT I

Operations Research: Scope, O.R models, Linear Programming - Formulation, graphical method, simplex method, big -M method and special cases.

UNIT II

Assignment Model: Formulation, optimal solution by Hungarian method, maximization problem, balanced and unbalanced problems, restriction models.

Sequencing Models: Introduction, Johnson's Rule, processing n jobs through two machines, processing n jobs through three machines and processing n jobs through m machines.

UNIT III

Transportation Problem: Introduction, finding initial basic feasible solutions, optimality test, alternate solutions and unbalanced transportation problem.

UNIT IV

Game Theory: Introduction, minimax (maximin) method of optimal strategies, saddle point, value of the game, rectangular games without saddle point, dominance principle, graphical method.

Queuing Theory: Introduction, terminology, single channel models with finite queue length and non-finite queue length.

UNIT V

Introduction to Project Management: Terminology, methods of finding critical path -critical path method (CPM), project evaluation and review technique (PERT) - probability of completing the project within scheduled time and crashing.

4. Books and Materials

Text Book(s)

1. S.D. Sharma, *Operations Research*, New Delhi: Kedarnath Publications, 2017
2. S.R. Yadav and A.K. Malik, *Operations Research*, New Delhi: Oxford University Press, 2014.

Reference Book(s)

1. Hamdy Abdelaziz Taha,*Operations Research*: *an Introduction*, 9th edition, Pearson, Boston,2015.
2. Prem Kumar Gupta & D S Hira*, Operations Research*, Revised edition, New Delhi: S. Chand Publishing, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1382 – MECHANICAL TECHNOLOGY

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

1. Course Description

Course Overview

This course provides knowledge to select the required material for different engineering applications. It also deals with basic concepts of internal combustion engines, compressors, power transmission systems and welding processes. The student will be able to apply the knowledge of engines, materials and welding processes which can be used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1382.1 Identify the types of engines and their cycles.

A1382.2 Classify the reciprocating air compressors and their working principles.

A1382.3 Discus the constructional features of domestic refrigeration and air conditioning systems.

A1382.4 Inspect the mechanism of power transmission elements of various engineering systems.

A1382.5 Select suitable engineering materials and welding methods for real time applications.

3. Course Syllabus

UNIT I

I.C. Engines: working principle, 4 stroke and 2 stroke engines, comparison.

UNIT II

Reciprocating Air compressors: Description and working of single stage and multistage reciprocating air compressors – inter cooling.

UNIT III

Refrigeration systems: Study of household refrigerator, window air conditioner, split air conditioner ratings and selection criteria of above devices

UNIT IV

Transmission of power: Belt, Rope, Chain and gear drive.

UNIT V

Engineering materials and welding processes: Engineering materials, properties of materials, gas welding, arc welding, soldering and brazing.

4. Books and Materials

Text Book(s)

1. R.S Khurmi & JS Gupta, *Thermal Engineering*, New Delhi S Chand, 2012.
2. P.L. Ballaney, *Refrigeration and Air Conditioning,* 2nd edition, 2012.

Reference Book(s)

1. R.K. Jain and S.C. Gupta, *Production Technology*, New Delhi, Khanna Publishers,2012.
2. S.N. Lal, Elements *of Mechanical Engineering*, Cengage Learning, 2013.

COURSE STRUCTURE

A1383 – INTRODUCTION TO AUTOMOBILE SYSTEMS

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

1. Course Description

Course Overview

This course provides a broad knowledge about the automobile mechanisms like transmission, final drive, braking system, front axle, steering, frame and chassis. It also covers emission and electrical systems used in automobiles. This knowledge will be helpful to the student in co-relating various systems with each other and understanding the individual systems in a better manner while using them in daily life.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1383.1 Identify the different parts of the automobile systems used in daily life.

A1383.2 Analyze brakes, steering, axles, suspension and frames of an engine for better performance.

A1383.3 Inspect the mechanism of power transmission elements, and applications of various engineering systems.

A1383.4 Compare the significance of various engines in terms of their performance.

A1383.5 Classify various electrical systems that are used for efficient functioning of automobiles.

3. Course Syllabus

UNIT I

Introduction- History, Industrial revolution, Development in automobile industry, leading manufacturers.

UNIT II

Classification of vehicles: On the basis of load, wheels, final drive, fuel used, position of engine and steering transmission, body and load, layout of an automobile chassis function of major components of a vehicle such as frame, transmission (clutch and gearbox), braking system, types of suspension, principle and its components.

UNIT III

Introduction to thermodynamics: First and second laws of thermodynamics, Otto cycle, diesel cycle. Types of automotive fuels, properties of fuels, air requirement for complete combustion of fuel.

Introduction to IC engines: Concept of two stroke and four stroke petrol and diesel engines and their applications to automobiles, various terms, specification of automobile engines.

UNIT IV

Emissions from automobiles – Pollution standards national and international, pollution control techniques, multipoint fuel injection for SI engines- common rail diesel injection, emissions from alternative energy sources– hydrogen, biomass, alcohols, LPG, CNG.

UNIT V

Electrical system- Charging circuit, generator, current and voltage regulator, starting system, Bendix drive, mechanism of solenoid switch, lighting systems, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.

4. Books and Materials

Text Book(s)

1. Kirpal Singh, Automotive *Mechanics – Vol. 1 & Vol. 2*, Standard Publishers Distributors, 13th edition, 2013
2. R.S Khurmi & JS Gupta, Thermal Engineering, New Delhi S. Chand, 2012.

Reference Book(s)

1. PL Ballaney, *Thermal Engineering*, New Delhi, Khanna Publishers,2013.
2. M.L. Mathur, F.S. Mehta and R.P. Tiwari, Elements of Mechanical Engineering, New Delhi, Jain Brothers,2013

COURSE STRUCTURE

A1481 – BASIC ELECTRONICS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

A1003 –Engineering Physics

2. Course Outcomes (COs)

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

A1481.1 Analyze the operation and characteristics of diodes and transistors.

A1481.2 Analyze various applications of diodes and transistors.

A1481.3 Make use of Boolean algebra postulates to minimize boolean functions.

A1481.4 Construct and analyze various combinational and sequential circuits used in digital systems.

3. Course Syllabus

UNIT I

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

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

UNIT II

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

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

UNIT III

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

UNIT IV

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

UNIT V

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

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1482 – INTRODUCTION TO COMMUNICATION SYSTEMS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1482.1 Analyze the operation of basic communication system.

A1482.2 Compute the Fourier transform, energy and power of communications signals.

A1482.3 Compare the performance of different modulation schemes used in communication systems

A1482.4 Differentiate time division and frequency division multiplexing techniques.

A1482.5 Select an appropriate modulation technique while designing a communication system.

3. Course Syllabus

UNIT I

Operations on signals: Fourier series, Fourier transform, Energy, Power, Bandwidth, Sampling.

Communication Systems: Components, Analog and digital messages, channel effect, signal to noise ratio and capacity.

UNIT II

Modulation and Detection: Definition, transmission, multiplexing, demodulation.

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

UNIT III

Angle Modulation: Phase modulation, Frequency Modulation.

Pulse Modulation: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).

UNIT IV

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

UNIT V

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

Time-Division Multiplexing (TDM).

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. Sham Shanmugam. *Digital and Analog Communication Systems*, Wiley-India edition,2006.
2. A. Bruce Carlson, and Paul B. Crilly. *Communication Systems,An Introduction to Signalsand Noise in Electrical Communication*, McGraw-Hill International Edition,5th edition, 2010.
3. Herbert Taub and Donald L Schilling. *Principles of Communication Systems*, Tata McGraw-Hill,3rd edition,2009.

COURSE STRUCTURE

A1483 – FUNDAMENTALS OF IOT

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1483.1 Analyze IoT applications using IoT enablers and connectivity layers, components.

A1483.2 Distinguish sensors and actuators in terms of their functions and applications.

A1483.3 Interface I/O devices, Sensors using Arduino UNO.

A1483.4 Develop Raspberry Pi Interfacing programs using python concepts.

A1483.5 Apply Raspberry Pi and Arduino Uno programming for IoT bases projects

3. Course Syllabus

UNIT I

Introduction to IoT: Characteristics of IoT, Applications of IoT, IoT categories, IoT enablers and connectivity layers, IoT components.

UNIT II

Sensors and Actuators: Sensors-definition, characteristics of sensor, classification of sensors, Actuators-definition, types of Actuators.

UNIT III

Programming with Arduino: Introduction to Arduino UNO, Arduino IDE, Basic commands, Serial commands. LED Interface, Switch Interface, Serial Interface, temperature Sensor Interface

UNIT IV

Python: Overview of Python, features, comments, variables, operators, data types, If statement, functions, for loop, while loop, strings, lists, tuples, dictionaries.

UNIT V

Programming with Raspberry Pi: Introduction to Raspberry Pi, Installation of raspbian OS, connecting to laptop, terminal commands, LED Interface, Button Interface, DHT sensor interface.

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE

A1581 –BASIC DATA STRUCTURES

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

1. Course Description

Course Overview

The aim of this course is to provide insight in organizing data types logically to access and configure the data. The concepts of linear and non-linear data structure algorithms are discussed. It improves the problem-solving ability of a learner to a great extent which can be applied in various fields of engineering.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

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

A1581.1 Analyze the time and space complexities of algorithms

A1581.2 Apply various operations on linear data structures

A1581.3 Design searching and sorting techniques for a given application

A1581.4 Develop nonlinear programming for optimization techniques

3. Course Syllabus

UNIT I

Introduction and Overview: Definition, Concepts of Data Structures, Overview and Implementation of Data Structures.

UNIT II

Linear Data Structures: Stacks- Introduction, Definition, Representation of Stack, Operations on Stacks, Applications of Stacks, Queues- Introduction, Definition, Representations of Queues, Various Queue Structures, Applications of Queues.

UNIT III

Linked lists: Definition, Single linked list, Circular linked list, Double linked list, Circular Double linked list, Application of linked lists.

UNIT IV

Sorting and Searching: Sorting- Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Time complexity. Searching - Sequential Search, Binary Search, time complexity.

UNIT V

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. G A Vijayalakshmi Pai. *Data Structures and Algorithms*. TMH, 2008.
2. Horowitz, Sahni and Anderson Freed. *Fundamentals of Data Structures in C*. 2nd edition, Universities Press, 2012.

COURSE STRUCTURE

A1582 – FUNDAMENTALS OF DBMS

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

1. Course Description

Course Overview

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

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

A1582.1	Apply suitable data models for given application
A1582.2	Design database using integrity constraints and ACID properties
A1582.3	Construct optimized SQL queries to solve real time problems
A1582.4	Apply suitable normal form to eliminate data redundancy
A1582.5	Choose appropriate index structure to improve performance

3. Course Syllabus

UNIT I

Introduction: Basics of Database System Applications, Principle of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages - DDL, DML, ER diagrams.

UNIT II

Relational Model: Fundamentals of Relational Model - Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Views, ACID Properties.

UNIT III

SQL: Basic SQL Queries, Introduction to Sub queries, Correlated Sub queries, Set - Comparison Operators, Aggregate Operators, NULL values, logical operators, Joins.

UNIT IV

Normalizations: Redundancy Issues, Decompositions, Functional Dependencies, various Normal Forms.

UNIT V

Data on External Storage: File Organization and various indexing structures.

4. Books and Materials

Text Book(s)

1. Raghurama Krishnan, *Johannes Gehrke, Database Management Systems,* McGraw-Hill Education, 3rd edition, 2014.

Reference Book(s)

1. A. Silberschatz, H.F. Korth, Sudarshan, Database *System Concepts*, McGraw Hill, 6th edition, 2012.
2. RamezElmasri, Shamkat B. Navathe, *Database Systems,* Pearson Education, 6th edition 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1583 – BASICS OF SOFTWARE ENGINEERING

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

1. Course Description

Course Overview

This course deals with engineering principles and programming languages applied in software development. These principles include analyzing user requirements, designing, building, and testing software. The knowledge acquired through this course is used to handle big projects efficiently with minimizing cost and reduced complexity.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1583.1 Apply the phases of software development life cycle in application development

A1583.2 Identify software requirements for construction

A1583.3 Design requirement engineering process for change management

A1583.4 Apply the design concepts for design models

A1583.5 Construct the various testing techniques for software systems

3. Course Syllabus

UNIT I

Introduction: Software engineering and process models: Introduction, changing nature of software, software myths.

UNIT II

Process Models: Waterfall model, incremental process models, evolutionary process models, The unified process, agile process models.

UNIT III

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, The software requirements document.

UNIT IV

Requirement Engineering Process: Feasibility studies, requirements elicitation and analysis, requirement validation, requirement management.

UNIT V

Design: Design process and design quality, design concepts-abstraction, information hiding, functional independence, refactoring, modularity, refinement, design classes, design model.

Testing: Testing strategies-A Strategic approach to software testing, test strategies for conventional software, white box testing, black box testing, validation testing, system testing.

4. Books and Materials

Text Book(s)

1. Roger S. Pressman, *Software Engineering*, A Practitioner's Approach, McGraw Hill, International Edition, 8th edition, 2015.

Reference Book(s)

1. Sommerville, *Software Engineering*, Pearson education, 7th edition, 2008.

COURSE STRUCTURE

A1584 –PYTHON FOR EVERYONE

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

1. Course Description

Course Overview

The aim of this course is to provide the fundamentals of Python language. It covers data types, operators, control statements, data structures, functions, modules, exception handling and file handling concepts. This course helps the student in selecting a domain path leading to software engineering in the segment of Artificial intelligence, Data Science and IoT.

Course Pre/Corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1584.1 Apply the basic constructs of Python to solve problems

A1584.2 Organize lists, tuples and dictionaries appropriately to solve complex problems

A1584.3 Build functions to increase code reusability

A1584.4 Implement modular programming for organized software development

A1584.5 Make use of exception handling for robust programming

3. Course Syllabus

UNIT I

Introduction to python programming: History of python, Basics, python character set, tokens, data types, input and output functions, formatting numbers and strings, Operators.

Control statements: Decision making statements, Loop control statements, nested loops, break and continue statements.

UNIT II

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

UNIT III

Functions- Basics of functions, syntax, local and global scope of a variable, Recursions, lambda functions, parameters and arguments in functions.

UNIT IV

Modules: The from…import statement, Making your own Modules, dir() function, The Python Module, Modules and Namespaces, Packages, Standard Library modules.

UNIT V

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

File Handling: Introduction, need of file handling, text input and output files, seek function, binary files, Extracting data from a file.

4. Books and Materials

Text Book(s)

1. Ashok NamdevKamthane, Amit Ashok Kamthane. *Programming and problem solving with python.* McGraw-Hill Education, 2018.

Reference Book(s)

1. Martin C.Brown. *The Complete Reference: Python*. McGraw-Hill, 2018.
2. ReemaThareja. *Python programming using problem solving approach*. Oxford, 2019.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1585 – COMPUTER ORGANIZATION AND OPERATING SYSTEMS

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

1. Course Description

Course Overview

This course is a combination of computer organization and operating system concepts. It provides the concepts of Computer Architecture and Organization which focuses on register transfers, micro-operations and computer arithmetic concepts. Operating Systems covers the basic operating system abstractions, mechanisms, and their implementations. The learner of this course can choose his/her carrier as system architect or as system programmer.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1585. 1 Analyze the fundamentals of computer organization in designing a system

A1585.2 Apply the concepts of programming language to solve system problems

A1585.3 Make use of the Operating Systems design structure and its services for system programming

A1585.4 Develop Process Scheduling algorithms and Inter-Process Communication systems for resource management

A1585.5 Classify memory management techniques and virtual memory mechanisms for apt implementations

3. Course Syllabus

UNIT I

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input/output and interrupt, complete computer description, design of basic computer.

UNIT II

Programming the Basic Computer: Introduction, machine language, assembly language, the assembler, programming arithmetic and logic operations.

UNIT III

Operating Systems: Introduction, What operating systems do, operating system -structure, operations, services, user operating system interface, system calls, types of system calls.

UNIT IV

Process Management: Process concept, process scheduling, scheduling criteria, scheduling algorithms, operations on processes, inter process communication, examples of ipc systems, process synchronization, critical section problem, semaphores, and monitors.

UNIT V

Memory Management: Main memory-background, swapping, contiguous memory allocation, segmentation, paging, virtual memory-background, demand paging, page replacement, allocation of frames.

Deadlocks: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

4. Books and Materials

Text Book(s)

1. M. Morris Mano, *Computer system architecture*, Pearson Education, 5th edition, 2016.

Reference Book(s)

1. Willam Stallings, *Computer Organization and Architecture Designing for Performance*, Pearson, PHI, 6th edition, 2010.
2. Silberschatz, Galvin and Gagne, *Operating System Concepts*, 9th edition, 2013, Wiley India edition.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1586 – FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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

1. Course Description

Course Overview

This course provides the insight of basic Artificial Intelligence concepts along with fundamentals of machine learning, deep learning and neural networks. It covers math-heavy topics, such as regression and classification illustrated by Python examples. In addition, it also focuses on AI with search techniques and machine learning types. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

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

A1586.1 Analyze different fields in which AI is applied

A1586.2 Apply suitable search strategies in finding better solution for a given problem

A1586.3 Identify linear regression with single and multiple variables

A1586.4 Perform predictive analysis using decision trees and random forest classifier

A1586.5 Implement deep learning neural network models with TensorFlow

3. Course Syllabus

UNIT I

Principles of Artificial Intelligence: Introduction, Fields and Applications of Artificial Intelligence, AI Tools and Learning Models, The Role of Python in Artificial Intelligence

UNIT II

AI With Search Techniques: Introduction, heuristics, Uniformed and informed search strategies, Path finding with the A* Algorithm.

UNIT III

Regression: Introduction, Linear Regression with One Variable, Linear Regression with Multiple Variables, Polynomial and Support Vector Regression.

UNIT IV

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

UNIT V

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

4. Books and Materials

Text Book(s)

1. Zsolt Nagy, *Artificial Intelligence and Machine Learning Fundamentals*, Packt publishing, 2018.

Reference Book(s)

1. Dr. Dheeraj Mehrotra, *Basics of Artificial Intelligence & Machine Learning*, Notion Press, 1st edition 2019.
2. Neil Wilkins, *Artificial Intelligence: An Essential Beginner's Guide to AI, Machine Learning, Neural Networks, Deep Learning*, Bravex Publications, 2019.

COURSE STRUCTURE

A1081 – MANAGEMENT SCIENCE

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

1. Course Description

Course Overview

The primary objective of this course is to provide the knowledge of Management in Success of Business. Further, students will be able to apply the Concepts, Theories, Principles of Management in various functional areas of an organization such as in Designing organization structures for managing the operations, Human Resource, Marketing and Production Departments. The student will able to evaluate cost and time of each business project by using PERT and CPM techniques and also formulate the new strategies that enhance competitive edge.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1081.1 Apply the concepts, theories, and principles of management in professional life.

A1081.2 Design suitable organization structure for managing the operations in the organization.

A1081.3 Apply principles of management to the various functional areas of an organization such as Human Resource, Marketing and Production.

A1081.4 Evaluate cost and time of each business project by using PERT and CPM techniques.

A1081.5 Formulate the new strategies that enhance competitive edge.

3. Course Syllabus

UNIT I

Introduction to Management: Concept-Nature and Importance of Management, Functions-Evaluation of Scientific Management, Modern Management-Motivation Theories-Leadership Styles-Decision Making Process-Designing Organization Structure-Principles and Types of Organization.

UNIT II

Operations Management: Plant location and Layout, Methods of production, Work-Study-Statistical Quality Control through Control Charts, Objectives of Inventory Management, Need for Inventory Control -EOQ&ABC Analysis (Simple Problems)

Marketing Management: Meaning, Nature, Functions of Marketing, Marketing Mix, Channels of distribution - Advertisement and Sales Promotion - Marketing Strategies - Product Life Cycle.

UNIT III

Human Resource Management: Significant and Basic functions of HRM-Human Resource Planning (HRP), Job evaluation, Recruitment and Selection, Placement and Induction-Wage and

Salary administration, Employee Training and development – Methods - Performance Appraisal - Employee Grievances - techniques of handling Grievances.

UNIT IV

Strategic Management: Vision, Mission, Goals and Strategy- Corporate Planning Process-Environmental Scanning-SWOT analysis-Different Steps in Strategic Formulation, Implementation and Evaluation.

Project Management: Network Analysis-PERT, CPM, Identifying Critical Path-Probability-Project Cost Analysis, Project Crashing.

UNIT V

Contemporary Management Issues & Practices: Basic concepts of MIS-Materials Requirement Planning (MRP),Just-In-Time (JIT)System, Total Quality Management(TQM)-Six Sigma and Capability Maturity Models (CMM) evies, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing(BPO), Business Process Re-Engineering, Bench Marking, and Balance Score Card.

4. Books and Materials

Text Book(s)

1. A.R Aryasri, *Management Science,*4th edition, New Delhi: Tata McGraw Hill, 2013.

Reference Book(s)

1. Ashima B. Chhalill, P. Vijaya Kumar, N. AppaRaohalill, '*Introduction to Management Science*', 1st edition, New Delhi: Cengaage, 2012.
2. Vijay Kumar &Apparo: *Introduction to Management Science*, New Delhi Cengage, 2011.

COURSE STRUCTURE
A1082 – RESEARCH METHODOLOGY

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1082.1 Interpret the importance of literature survey to identify the research problem.

A1082.2 Develop suitable research methodologies to conduct engineering research.

A1082.3 Apply the principles of research to gather the required data from various sources.

A1082.4 Evaluate the gathered data by using appropriate statistical techniques.

A1082.5 Prepare and present the research report effectively with the help of visual aids.

3. Course Syllabus

UNIT I

Research Methodology: Objectives and Motivation of Research, Types of Research, Research Approaches, Significance of Research, Research Methods verses Methodology, Research and Scientific Method, Important of Research Methodology, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India, Benefits to the society in general, Defining the Research Problem: Definition of Research Problem, Problem Formulation, Necessity of Defining the Problem, Technique involved in Defining a Problem.

UNIT II

Literature Survey: Importance of Literature Survey, Sources of Information, Assessment of Quality of Journals and Articles, Information through Internet. Literature Review: Need of Review, Guidelines for Review, Record of Research Review.

UNIT III

Research Design: Meaning of Research Design, Need of Research Design, Feature of a Good Design Important Concepts Related to Research Design, Different Research Designs, Basic Principles of Experimental Design, developing a Research Plan, Design of Experimental Set-up, Use of Standards and Codes.

UNIT IV

Data Collection: Collection of primary data, Secondary data, Data organization, Methods of data grouping, Diagrammatic representation of data, Graphic representation of data. Sample Designed for sampling, some important sampling definitions, Estimation of population, Role of Statistics for

Data Analysis, Parametric V/s Non-Parametric methods, Descriptive Statistics, Measures of central tendency and Dispersion, Hypothesis testing, Use of Statistical software. Data Analysis: Deterministic and random data, Uncertainty analysis, Tests for significance: Chi-square, student's t-test, Regression modeling, Direct and Interaction effects, ANOVA, F-test, Time Series analysis, Autocorrelation and Autoregressive modeling.

UNIT V

Research Report Writing: Format of the Research report, Synopsis, Dissertation, Thesis its Differentiation, References/Bibliography/Webliography, Technical paper writing/Journal report writing, making presentation, Use of visual aids. Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing Research Grant Proposal.

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

COURSE STRUCTURE
A1083 – INTELLECTUAL PROPERTY RIGHTS

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

1. Course Description

Course Overview

The primary objective of the course is to have a general understanding of the basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Issues related to Patents. The Course addresses the means of innovations with an emphasis on trade secret that are necessary to obtain IPR through protect their innovations. It also encourages the students to take up innovations and establish start-ups.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1083.1 Analyze ethical and professional issues which arise in the intellectual property law context.

A1083.2 Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.

A1083.3 Analyze the social impact of intellectual property law and policy.

A1083.4 Make use of copyrighted material so that it does not obstruct the progress of human knowledge

A1083.5 Analyze IPR policies before filing patentable inventions and discoveries.

3. Course Syllabus

UNIT I

Introduction to Intellectual Property: Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

UNIT II

Trade Marks: Purpose and Function of Trade Marks, Acquisition of Trade Mark Rights, Protectable Matter, Selecting and Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT III

Law of Copy Rights: Fundamental of Copy Right Law, Originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice of Copy Right, International Copy Right Law. Law of Patents: Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer.

UNIT IV

Trade Secrets: Trade Secrete Law, Determination of Trade Secrete Status, Liability for Misappropriations of Trade Secrets, Protection for Submission, Trade Secrete Litigation. Unfair Competition: Misappropriation Right of Publicity, False Advertising.

UNIT V

New Developments of Intellectual Property: New Developments in Trade Mark Law; Copy Right Law, Patent Law, Intellectual Property Audits. International overview on Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development in Trade Secrets Law.

4. Books and Materials

Text Book(s)

1. K Bansal& P Bansal, *Fundamentals of Intellectual Property for Engineers,* BS Publications, ISBN: 9788178002774, 8178002779, Edition: 2013.

Reference Book(s)

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks Copyrights Patents and Trade Secrets*, 4th Edition, New Delhi: Cengage India, 2015, ISBN:9788131528976.
2. Prabuddha Ganguli, *Intellectual Property Rights– Unleashing the Knowledge Economy,* McGraw Hill Education; 1st Edition, 1st July 2017.
3. Integrating Intellectual Property Rights and Development Policy: *Report of the Commission on Intellectual Property Rights,* London September 2002 (web source: http://www.iprcommission.org/papers/pdfs/final_report/ciprfullfinal.pdf).

COURSE STRUCTURE
A1084 – NATIONAL SERVICE SCHEME

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

1. Course Description

Course Overview

The main objectives of National Service Scheme (NSS) are : understand the community in which they work, understand themselves in relation to their community, identify the needs and problems of the community and involve them in problem-solving, develop among themselves a sense of social and civic responsibility, utilize their knowledge in finding practical solutions to individual and community problems, develop competence required for group-living and sharing of responsibilities, gain skills in mobilizing community participation, acquire leadership qualities and democratic attitudes, develop capacity to meet emergencies and natural disasters and, practice national integration and social harmony

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1084.1 Classify the organizational structure of NSS and its activities.

A1084.2 Identify the methods of mobilization and importance of youth Leadership.

A1084.3 Develop a sense of social and civic responsibility and provide solutions to individual and community problems

A1084.4 Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions.

A1084.5 Develop capacity to meet emergencies and natural disasters

3. Course Syllabus

UNIT I

Introduction and Basic Concepts of NSS - History, philosophy, aims & objectives of NSS, Emblem, flag, motto. Song, badge etc., Organizational structure, rules and responsibilities of various NSS functionaries.

UNIT II

NSS Programmes and Activities - Concept of regular activities, special camping, Day Camps, Basis of adoption of village/slums. Methodology of conducting Survey, Financial pattern of the scheme, Other youth prog. /schemes of Goal, Coordination with different agencies, Maintenance of the Diary.

UNIT III

Understanding Youth - Definition, profile of youth. categories of youth, Issues, challenges and opportunities for youth, Youth as an agent of social change.

Importance and Role of Youth Leadership -Meaning and types of leadership, Qualities of good leaders; traits of leadership, Importance and rule of youth leadership

UNIT IV

Community Mobilization- Mapping of community stakeholders, Designing the message in the context of the problem and the culture of the Community, Identifying methods of mobilization.

UNIT V

Volunteerism and Shramdan: Indian Tradition of volunteerism, Needs & Importance of volunteerism, Motivation and Constraints of Volunteerism, sharamadan as a part of Volunteerism.

4. Books and Materials

Reference Book(s)

1. Khwajala Ghulama Saiyidain, National Service Scheme: A Report, Published by Ministry of Education, Govt. of India, 1961.
2. N. F. Kaikobad, Krishan K. Kapil, Training and consultancy needs in national service scheme, by. Published by the Tata Institute of Social Sciences (TISS), 1971.
3. National Service Scheme: guide-lines to project-masters, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971.

COURSE STRUCTURE
A1085 – YOGA

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

1. Course Description

Course Overview

Yoga is an invaluable gift of ancient Indian tradition. It embodies unity of mind and body; thought and action; restraint and fulfilment; harmony between man and nature and a holistic approach to health and well-being. Yoga is not about exercise but to discover the sense of oneness with ourselves, the world and Nature. By changing our lifestyle and creating consciousness, it can help us to deal with climate change. Stress and Depression have become silent killers. Yoga offers a solution to these ailments. Practicing Yoga helps fight stress and find peace. All you need is willingness to practice it.

Course Pre/corequisites

There is no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1085.1 Improve physical conditioning related to flexibility through participation in yoga.

A1085.2 Develop and maintain a personal yoga practice.

A1085.3 Recognize and apply the value and benefits of an on-going yoga practice

A1085.4 Select asanas appropriate for personal needs

A1085.5 Identify and apply relaxation techniques for stress reduction

3. Course Syllabus

UNIT I

Introduction of human body and its systems, definition of anatomy and physiology and importance in Yogic practices, respiratory system, digestive system, endocrine system. Origin of Yoga & its brief development, Meaning of Yoga & its importance, Yoga as a Science of Art (Yoga Philosophy), Meaning of meditation and its types and principles

UNIT II

Classification of Yoga/Types of Yoga - Hatha Yoga, Raja Yoga, Laya Yoga, Bhakti Yoga, Gyan Yoga, Karma Yoga, Asthang Yoga

UNIT III

Classification of Asanas and its Mechanism, Cultural Asana (standing, sitting, supinline, praline position & topsy-turvy), Meditative Asana and Relaxative Asana, Nervous System, Circulatory System

UNIT IV

Introduction of Kriya, Bandha and Mudra, importance of KRIYA and its scientific approach, importance of BANDHA and its scientific approach, importance of MUDRA and its scientific approach

UNIT V

Effect of Asanas on various Systems, Difference between Asana and Exercise, Difference between Pranayama and deep breathing and Yogic Diet.

4. Books and Materials

References:

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

COURSE STRUCTURE
A1086 – DESIGN THINKING

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

1. Course Description

Course Overview

This course introduces design thinking and its application to developing new products, services, and the organization of businesses. Design thinking is a human-centric, interdisciplinary approach towards innovation. Design thinking as practiced in this course blends creative thinking and logical or rational thinking, and involves a process consisting of empathizing, ideating, and prototyping. Students will learn design principles, methodologies, and frameworks, and apply them through exercises and projects. The course is divided into four main aspects, all interconnected but which we also separately emphasize. They are: (1) design methodologies, (2) the "thing" to be designed (i.e., products, services, or the business itself, e.g. the business model), (3) human attitudes and behaviors (towards the designs), and (4) design contexts.

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1086.1 Appreciate various design processes for creativity and innovation

A1086.2 Develop design ideas through different techniques

A1086.3 Identify the significance of reverse engineering about products

A1086.4 Make use of design drawings to communicate ideas effectively

A1086.5 Build organizations that support creative and innovative thinking

3. Course Syllabus

UNIT I

Introduction to Design Thinking, Definition, why is Design Thinking important, How is Design Thinking different, Process of design - Introduction – Product Life Cycle - Design Ethics, creativity, innovation and design, Design Process - Creativity and Innovation in Design Process - Design limitation, Preparing mind for Innovation-The physics of innovation.

UNIT II

Idea generation- The Idea, generation process, mind mapping tool. Experimentation-What works, learning launch tool, Strategic Opportunities, Creative people, creative organizations, Ideas, and tools to help both people and organizations work more creatively

UNIT III

Creative Thinking - Generating Design Ideas - Lateral Thinking –Analogies – Brainstorming - Mind mapping - National group Technique – Synectic's - Development of work - Analytical Thinking - Group Activities Recommended

UNIT IV

Reverse engineering - Introduction - Reverse Engineering Leads to New Understanding about Products -Reasons for Reverse Engineering - Reverse Engineering Process - Step by Step – Case Study

UNIT V

Basics of drawing to develop design Ideas- Introduction - Many Uses of Drawing - Communication through Drawing – Drawing Basis – Line - Shape/ Form – Value – Colour – Texture –Overview of drawing -Practice using Auto CAD recommended.

4. Books and Materials

Text Book(s)

1. John.R.Karsnitz, Stephen O 'Brien and John P. Hutchinson, "*Engineering Design*", Cengage learning (International edition) Second Edition,2013.
2. Yousef Haikand Tamer M. Shahin, "*Engineering Design Process*", Cengage Learning, Second Edition, 2011.

Reference Online Resources

1. https://courses.edx.org/register?course_id=coursev1%3AUQx%2BCORPINN1x%2B2T2020&enrollment_action=enroll&email_opt_in=false
2. https://www.coursera.org/programs/coursera-response-program-for-pcek-brht?collectionId=&productId=bfnQqUbbEeeMtBKozo_2UA&productType=course&showMiniModal=true
3. www.tutor2u.net/business/presentations/../productlifecycle/default.html orhttps://www.mindtools.com/brainstm.html
4. https://www.quicksprout.com/.../how-to-reverse-engineer-your-competit www.vertabelo.com/blog/documentation/reverse-engineeringhttps://support.microsoft.com/en-us/kb/273814
5. https://support.google.com/docs/answer/179740?hl=en https://www.youtube.com/watch?v=2mjSDlBaUlMthevirtualinstructor.com/foreshortening.html
6. https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdfwww.bizfilings.com›Home › Marketing› Product Development
7. https://canvas.uw.edu/courses/1023376/assignments/syllabus

COURSE STRUCTURE

A1087 – ENTREPRENEURSHIP DEVELOPMENT

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1087.1	Analyze the nature of entrepreneurship, risk and reward in modern business scenario
A1087.2	Identify the business challenges and opportunities by various case studies
A1087.3	Assess the promotion and institutional support by various agencies in India
A1087.4	Evaluate the role of angel investors in promotion and expansion of start-ups in India
A1087.5	Prepare effective and feasible project proposals and project reports

3. Course Syllabus

UNIT I

Introduction to Entrepreneurship: Introduction to entrepreneurship definition types of entrepreneur, entrepreneurial traits, Entrepreneur vs. Manager, Entrepreneur Vs Intrapreneur, Entrepreneurial decision process, Ethics and social responsibility of entrepreneurs, Opportunities for entrepreneurs in India and abroad. Creating and starting the venture, sources of new ideas, methods of generating ideas, creative problem solving, and product planning and development process.

UNIT II

Business Plan: The business plan nature and scope of business plan, writing business plan, evaluating business plans, using and implementing business plans, Marketing plan, financial plan, the organizational plan and Launching formalities.

UNIT III

The Financing & managing New Venture: Financing and managing the new venture, sources of capital, venture capital, angel investment, record keeping, recruitment, motivating and leading teams, financial controls, Marketing and sales controls, E-commerce, entrepreneurship and internet advertising.

UNIT IV

The New Venture Expansion Strategies: New venture expansion strategies and issues, features and evaluation of joint ventures, acquisitions, mergers, franchising. Public issues, rights issues, bonus issues and stock splits. Choosing location and layout, Issues related to selection of layout.

UNIT V

Production & Marketing Management: Production and Marketing Management: thrust of production management, selection of production techniques, plant utilization and maintenance, designing the work place, inventory control, material handling and quality control, Marketing functions, market segmentation, market research and channels of distribution, sales promotion and product pricing, global aspects of entrepreneurship.

4. Books and Materials

Text Books:

1. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management,* Sixth edition, Himalaya Publishing House, New Delhi, 2011.

Reference Books:

1. Poornima M Charantimath, *Entrepreneurship Development and Small Business Enterprises,* 2nd Edition, Pearson Education India: Bengaluru, August 2013.
2. S.S. Khanka, *Entrepreneurial Development*, 2nd Edition, S Chand Publishing: New Delhi, ISBN: 9788121918015, 2014.
3. Robert D Hisrich, Michael P Peters and Dean A Shepherd, *Entrepreneurship*, 6th Edition, TATA McGraw-Hill: New Delhi, 2007.