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).

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

(An Autonomous Institute affiliated to JNTUA, Ananthapuramu)

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

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

www.gpcet.ac.in

CURRICULUM FRAME WORK

UG - BACHELOR OF TECHNOLOGY

MECHANICAL ENGINEERING

Under R18 Regulations

B. Tech. - Regular Four-Year Degree Program

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

&

B. Tech. - Lateral Entry Scheme

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME STRUCTURE UNDER R18 REGULATIONS

B. TECH – MECHANICAL ENGINEERING

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

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

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PROGRAMME STRUCTURE UNDER R18 REGULATIONS

B. TECH – MECHANICAL ENGINEERING

III SEMESTER (II YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1011	Mathematics - III	BS	3	1	0	4	30	70	100
A1701	Managerial Economics & Financial Analysis	HS	3	0	0	3	30	70	100
A1307	Thermodynamics	PC	3	1	0	4	30	70	100
A1308	Engineering Mechanics	ES	3	1	0	4	30	70	100
A1309	Engineering Drawing for Mechanical Engineers	ES	3	0	2	4	30	70	100
A1310	Applied Mechanics laboratory	ES	0	0	3	1.5	30	70	100
A1311	Computer Aided Drafting Laboratory	PC	0	0	3	1.5	30	70	100
A1312	Basic Measurements Laboratory	PC	0	0	2	1	30	70	100
A1012	Quantitative Aptitude	BS	1	0	0	1	30	70	100
	TOTAL		16	03	10	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
A1313	Mechanics of Solids	PC	3	1	0	4	30	70	100
A1314	Thermal Engineering – I	PC	3	1	0	4	30	70	100
A1315	Kinematics of Machinery	PC	3	1	0	4	30	70	100
A1316	Manufacturing Technology	PC	3	0	0	3	30	70	100
A1317	Machine Drawing	ES	2	0	2	3	30	70	100
A1318	Mechanics of Solids Laboratory	PC	0	0	3	1.5	30	70	100
A1319	Thermal Engineering Laboratory	PC	0	0	3	1.5	30	70	100
A1320	Manufacturing Technology Laboratory	PC	0	0	2	1	30	70	100
A1013	Verbal Ability and Logical Reasoning	HS	1	0	0	1	30	70	100
A1321	Comprehensive Online Examination-I	PC	0	0	0	1	-	100	100
	TOTAL		15	03	10	24	270	730	1000

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PROGRAMME STRUCTURE UNDER R18 REGULATIONS

B. TECH – MECHANICAL ENGINEERING

V SEMESTER (III YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1322	Thermal Engineering - II	PC	3	0	0	3	30	70	100
A1323	Dynamics of Machinery	PC	3	1	0	4	30	70	100
A1324	Design of Machine Elements	PC	3	0	0	3	30	70	100
A1325	Fluid Mechanics and Hydraulic Machines	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
A1326	Fluid Mechanics and Hydraulic Machines Laboratory	PC	0	0	3	1.5	30	70	100
A1327	Machine Tools Laboratory	PC	0	0	3	1.5	30	70	100
A1328	Production Drawing Practice	PC	0	0	2	1	30	70	100
A1015	Human Values &Professional Ethics	MC	2	0	0	0	100*	0	100*
	TOTAL		20	01	08	23	270	630	900

VI SEMESTER (III YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1329	Operations Research	PC	3	0	0	3	30	70	100
A1330	Design of Transmission Systems	PC	3	1	0	4	30	70	100
A1331	Metal Forming Processes	PC	3	0	0	3	30	70	100
A1332	Heat Transfer	PC	3	0	0	3	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
A1333	Heat Transfer Laboratory	PC	0	0	3	1.5	30	70	100
A1334	CAD/CAM Laboratory	PC	0	0	3	1.5	30	70	100
A1335	Comprehensive Online Examination – II	PC	0	0	0	1	-	100	100
A1016	Advanced English Language Communication Skills	MC	2	0	0	0	100*	0	100*
	TOTAL		20	01	06	23	240	660	900

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

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PROGRAMME STRUCTURE UNDER R18 REGULATIONS

B. TECH – MECHANICAL ENGINEERING

VII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1336	Production and Operations Management	PC	3	0	0	3	30	70	100
A1337	Finite Element Method	PC	3	0	0	3	30	70	100
A1338	Instrumentation and Control Systems	PC	3	0	0	3	30	70	100
A1341	Additive Manufacturing	PC	2	0	0	2	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
A1339	Instrumentation and Control Systems Laboratory	PC	0	0	3	1.5	30	70	100
A1340	Computer Aided Engineering Laboratory	PC	0	0	3	1.5	30	70	100
A1342	Mini-Project/Internship	PW	0	0	4	2	100	0	100
A1343	Project Work Phase-I	PW	0	0	4	2	100	0	100
	TOTAL		15	01	16	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
	MOOC/ Professional Elective-5	PE	3	0	0	3	30	70	100
	Open Elective – 3	OE	3	0	0	3	30	70	100
A1344	Technical Seminar	PW	0	0	4	2	100	-	100
A1345	Project Work Phase-II	PW	0	0	16	8	60	140	200
	TOTAL		06	00	20	16	220	280	500

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PROGRAMME STRUCTURE UNDER R18 REGULATIONS

B. TECH – MECHANICAL ENGINEERING

Professional Electives

Professional Elective – 1	
Course Code	**Title of the Course**
A1351	Machining Processes
A1352	Non-Conventional Sources of Energy
A1353	Engineering Materials for Design
A1354	Principles of Management

Professional Elective – 2	
Course Code	**Title of the Course**
A1355	Flexible Manufacturing System
A1356	Refrigeration and Air Conditioning
A1357	Mechanical Vibrations
A1358	Energy Management

Professional Elective – 3	
Course Code	**Title of the Course**
A1359	Project Management
A1360	Automobile Engineering
A1361	Tribology
A1362	Precision Engineering

Professional Elective – 4	
Course Code	**Title of the Course**
A1363	Modern Manufacturing Methods
A1364	Gas Turbines and Jet Propulsion
A1365	Artificial Intelligence for Mechanical Engineers
A1366	Digital Manufacturing

Professional Elective – 5	
Course Code	**Title of the Course**
A1367	Industrial Engineering
A1368	Power Plant Engineering
A1369	Composite Materials
A1370	Automation and Robotics

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PROGRAMME STRUCTURE UNDER R18 REGULATIONS

B. TECH – MECHANICAL 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
MECHANICAL ENGINEERING

I B.Tech. - I Semester

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	A1001	Functional English	3	1 -	3
2.	A1002	Mathematics – I	3	1 -	3
3.	A1501	Computer Programming	3	1 -	3
4.	A1004	Engineering Chemistry	3	1 -	3
5.	A1005	Environmental Studies	3	1 -	3
6.	A1006	English Language Communication Skills Lab	-	- -	2
7.	A1010	Engineering Chemistry Lab	-	- -	2
8.	A1502	Computer Programming Lab	-	- -	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 circuit.

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

UNIT – II

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

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

UNIT – III

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

Radius of curvature.

UNIT – IV

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

UNIT – V

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

Text Books:

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

References:

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

Outcomes:

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

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

I B.Tech. I - Semester

T	Tu	C
3	1	3

(A1501) COMPUTER PROGRAMMING
(Common to All Branches)

Objectives:

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

UNIT - I

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

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

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

Text Books:

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

References:

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

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

Outcomes:

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

I B.Tech. I - Semester

T	Tu	C
3	1	3

(A1004) ENGINEERING CHEMISTRY

Objectives:

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

UNIT – I WATER QUALITY AND TREATMENT

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

Industrial Use of water:

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

Treatment of Boiler Feed water:

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

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

UNIT – II POLYMERS

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

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

Elastomers

Natural Rubber; Processsing of natural rubbers, Compounding of Rubber

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

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

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

UNIT – III ELECTROCHEMISTRY

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

ii) Corrosion: Introduction, type of corrosion (Concentration cell corrosion, Galvanic

corrosion), Chemical (Dry) and Electrochemical (Wet) Theory of corrosion. Galvanic series, factors affecting the

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

UNIT – IV FUELS AND COMBUSTION

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

Liquid Fuels:

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

Petrol: Bergius Processes, Fischer Troph‟s synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

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

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

UNIT – V CHEMISTRY OF ENGINEERING MATERIALS

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

ii) Refractories: Introduction, Classification , properties and applications

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

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

Text Books:

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

References:

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

Outcomes: The student is expected to:

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

I B.Tech. I - Semester

T	Tu	C
3	1	3

(A1005) ENVIRONMENTAL STUDIES

Objectives:

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

UNIT – I

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

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

UNIT – II

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

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

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

UNIT – III

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

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

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

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development

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

UNIT – V

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

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

Text Books:

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

References:

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

Outcomes:

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

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

(A1010) ENGINEERING CHEMISTRY LAB
(Common to ECE/EIE/ME/IT)

Objectives:

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

List of Experiments:

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

(Any 10 experiments from the above list)

References:

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

Outcomes:

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

I B.Tech. I - Semester **P C**
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.	A1008	English for Professional Communication	3	1 - -	3
2.	A1009	Mathematics – II	3	1 - -	3
3.	A1305	Material Science and Engineering	3	1 - -	3
4.	A1003	Engineering Physics	3	1 - -	3
5.	A1301	Engineering Drawing	-	- 6 -	3
6.	A1306	Material Science and Engineering Lab	-	- - 4	2
7.	A1007	Engineering Physics Lab	-	- - 4	2
8.	A1302	Engineering & IT Workshop	-	- - 4	2
					21

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

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-Hill Education, 2007.

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

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

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

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

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

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. (ME) | **Th** | **Tu** | **C**
3 | **1** | **3**

(A1305) MATERIAL SCIENCE AND ENGINEERING

Course Objective:
To gain and understanding of the relationship between the structure, properties, processing, testing, heat treatment and applications of metallic , non metallic, ceramic and composite materials so as to identify and select suitable materials for various engineering applications.

UNIT I

STRUCTURE OF METALS: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

CONSTITUTION OF ALLOYS: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

Learning outcome & Suggested Student Activities:
Students will get knowledge on bonds of solids and knowing the crystallization of metals. By knowing the grain size and shape through the crystallization, he may understand the effect of grain boundaries on the properties of metals and finally he determines the grain size that is very essential for analyzing the microstructures of metals.
Students are advised to refer the following websites www.physics.rutgers.edu/meis/pubs/BB_thesis.pdf www.ce.berkeley.edu/~paulmont/CE60New/alloys-steel.pdf for better understanding of this topic.

UNIT II

EQUILIBRIUM OF DIAGRAMS: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, and Fe-Fe_3C

Learning outcome & Suggested Student Activities:
Students will be able to construct the equilibrium diagrams by experimental methods and knowing all types of equilibrium diagrams isomorphs alloy systems , electric systems, pertectic systems solid-state transformations etc. while studying all these diagrams he may able to know about lever rule and phase rule.
Students are advised to visit the following URLs website www.freelance-teacher.com/videos.htm www.susqu.edu/brake/aux/downloads/papers/foamcomp.pdf for better understanding of this topic.

UNIT III

CAST IRONS AND STEELS: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

NON-FERROUS METALS AND ALLOYS: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

Learning Outcome &Suggested Student Activities:
Students will be able to learn the structure and properties of all cast irons, steels and Non-ferrous metal alloys of copper, Al and Titanium. Students are advised to visit any Machine shop in the industries like SAIL, Visakhapatnam steel plant etc.,Students are advised to visit the following website.www.buzzle.com, www.mhprofessional.comwww.eng.sut.ac for better understanding of this topic.

UNIT IV

HEAT TREATMENT OF ALLOYS: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys. Heat treatment of plastics

Learning outcome & Suggested Student Activities:

Students will be able to learn the methods of different heat treatments i.e. annealing, normalizing and hardening. He also learns the different of alloying elements on Iron-Iron carbon system, the importance of TTT diagrams, Harden ability that are very essential for melting science. Finally, he learn about the heat treatment of cryogenic environment as an advance topic.

Students are advised to go through the URLs http://www.nptel.iitm.ac.in/and iisc.ernet.in for video lectures,http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv180-Page1.htm

UNIT V

CERAMIC MATERIALS: Crystalline ceramics, glasses, cermets.

COMPOSITE MATERIALS: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, polymer composites, metal ceramic mixtures, metal – matrix composites and Carbon – Carbon composites.

Learning Outcome & Suggested Student Activities:

This unit helps the students to understand the importance of advanced composite materials in application to sophisticated machine and structure of components, These composite materials helps to develop the components with required properties which we cannot attain using the metals & metal alloys.

Examples of products maybe of composite materials are air cooler bodies, fiber reinforced hose pipes, boat bodies some automobile body frames etc. Students may refer the following website for better understanding

www.susqu.edu/brake/aux/downloads/papers/foamcomp.pdf; .Asmenternation.orgwww.princeton.edu/~achaney/tmve/wiki100k/doc/metal_matrix_composite.html

Text Books:

1. *Introduction to Physical Metallurgy, Sidney H. Avner, US, 2nd Edition, 2007 Tata McGraw-Hill,*
2. *Essential of Materials Science and Engineering, Donald R.Askeland, USA, 3rd Edition, Cengage Publisher,2013.*

Reference Books:

1. *Material Science and Metallurgy, U.C. Jindal, pearson educations, 2011,*
2. *Elements of Materials Science and Engineering, Lawrance H. Van Vlack, pearson educations, 6th Edition,2002.*
3. *Material Science and Metallurgy, kodgire V.D, 12th Edition, Everest Publishing House,2002.*
4. *Engineering Mechanics of Composite Materials- Isaac and M Daniel, Oxford University Press, 1994, 2nd Edition 2013.*
5. *Mechanics of Composite Materials, R. M. Jones, McGraw Hill Company, New York, 1975.*
6. *Science of Engineering Materials, Agarwal, TMH.*
7. *Materials Science and Engineering, William D. Callister, 8th Edition,2010.*
8. *Elements of Material science, V. Rahghavan, PHI, 5th Editon.*
9. *Engineering Materials and Their Applications – R. A Flinn and P K Trojan, Jaico Books.*
10. *Engineering materials and metallurgy, R.K.Rajput, S.Chand, 1st Editon,2008.*

Web References:

www.asminternational.org
www.henry.wells.edu
www.ce.berkeley.edu
www.sjsu.edu

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

(A1003) ENGINEERING PHYSICS

Objectives:

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

UNIT - I
PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

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

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

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

UNIT – II
CRYSTALLOGRAPHY AND ULTRASONICS

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

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

UNIT – III
QUANTUM MECHANICS AND ELECTRON THEORY

*Quantum Mechanics: M*atter waves–de'Broglie hypothesis and properties - Schrodinger's time dependent and independent wave equations – Physical significance of wave function - Particle in one dimensional infinite potential well.
Electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Source of electrical resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT – IV
SEMICONDUCTORS AND MAGNETIC MATERIALS
Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Formation of p-n junction.
Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative treatment) – Hysteresis - Soft and hard magnetic materials, applications of magnetic materials.

UNIT – V
SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS
Superconductivity: Introduction - Effect of magnetic field - Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth - BCS theory (qualitative treatment) — Josephson effects –Applications of superconductors.
Physics of Nanomaterials: Introduction - Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel –Applications of nanomaterials.

Text Books:

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

References:

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

Outcomes:

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

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

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

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

(A1301) ENGINEERING DRAWING

Objectives:

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

UNIT I

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

UNIT II

Scales: Plain, Diagonal and Vernier;

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

UNIT III

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

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

UNIT IV

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

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

UNIT V

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

***Text Books**:*

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

***References**:*

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

Outcomes:

- Drawing 2D and 3D diagrams of various objects.

- Learning conventions of Drawing, which is an Universal Language of Engineers.
- Drafting projections of points, planes and solids.

B.Tech. I - II Sem. (ME) **P C**

4 2

(A1306) MATERIAL SCIENCE and ENGINEERING LAB

1. Mounting and preparation of Specimen.
2. Preparation and study of the Micro Structure of Ferrous metal
3. Preparation and study of the Microstructure of Non - Ferrous metals (Cu, Al….. etc)
4. Preparation and study of the Microstructure of Mild Steel, Low carbon Steels, High carbon steels
5. Study of the Micro Structures of Cast Irons.
6. Study of the Micro Structures of Non-Ferrous alloys.
7. Study of the Micro structures of Heat treated steels.
8. Hardeneability of steels by Jominy End Quench Test.
9. To find out the hardness of various treated and untreated steels.
10. Fracture testing of materials.
11. Fatigue testing of meterials.
12. Creep Testing of materials.

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

(A1007) ENGINEERING PHYSICS LABORATORY

Objectives:

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

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

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

References:

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

Outcomes:

- Would recognize the important of optical phenomenon like Interference and diffraction.

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

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

B.Tech. I - II Sem. (ME) **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

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

(AUTONOMOUS)

Course Structure for II B.Tech – R18 Regulations

MECHANCIAL ENGINEERING

III SEMESTER									
Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1011	Mathematics III	BS	3	1	0	4	30	70	100
A1701	Managerial Economics & Financial Analysis	HS	3	0	0	3	30	70	100
A1307	Thermodynamics	PC	3	1	0	4	30	70	100
A1308	Engineering Mechanics	ES	3	1	0	4	30	70	100
A1309	Engineering Drawing for Mechanical Engineers	ES	3	0	2	4	30	70	100
A1310	Applied Mechanics laboratory	ES	0	0	3	1.5	30	70	100
A1311	Computer Aided Drafting Laboratory	PC	0	0	3	1.5	30	70	100
A1312	Basic Measurements Laboratory	PC	0	0	2	1	30	70	100
A1012	Quantitative Aptitude-I	HS	1	0	0	1	30	70	100
		TOTAL	18	03	10	24	270	630	900

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Title of the Course :	**MATHEMATICS-III**			
Branches for which this course is offered**:**	**ME - III SEMESTER**	L	T	C
		3	1	4

Course Overview:
This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include:Solution of system of linear equations, Eigen values and Eigen vectors, Quadratic forms,Solutions of algebraic & transcendental equations,Interpolation, curve fitting,Numerical solutions of differentiation ,Integration,solutions of ODE of first order.The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Outcomes :	
After successful competion of the course , the student will be able to	
CO1	Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations, linear dependence and independence
CO2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem. Define a quadratic form and determine its nature using Eigen values
CO3	Perform the solutions of algebraic and transcendental equations employing bisection method, false position method and Newton-Raphson method
CO4	Understand the technique of interpolation along with Lagrange's formula and Newton's interpolation formulae.
CO5	Understand and apply the concepts of curve fitting, numerical differentiation and integration.
CO6	Interpret the numerical solutions of ordinary differential equations employing Taylor series, Euler's, Picard's and Runga-kutta methods.

Course Content:		
Unit-I	THEORY OF MATRICES, EIGEN VALUES AND EIGEN VECTORS	Lecturer Hours:11Hrs
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, Quadratic forms up to three variables: Rank, index, signature and nature of quadratic forms using eigen values.		

Unit-II	SOLUTION OF ALGEBRAIC & TRANSCENDENTAL EQUATIONS	Lecturer Hours:8 Hrs
Solutions of Algebraic and transcendental equations: Introduction-The Bisection method-The Method of False Position-Iteration Method -Newton-Raphson Method.		
Unit-III	INTERPOLATION	Lecturer Hours:8Hrs
Introducton: Finite differences, Other difference operators and relations between them, Differences of a polynomial, Missing terms, Newton's interpolation formulae, Interpolation with unequal intervals: Lagrange's interpolation formula.		
Unit-IV	NUMERICAL DIFFERENTIATION, INTEGRATION AND CURVE FITTING	Lecturer Hours:8Hrs
Numerical differentiation: Derivatives using Newton's interpolation formulae. Numerical integration: Newton-Cotes quadrature formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule. Curve Fitting: Method of least squares, Fitting a straight line, second degree parabola and other curves of the form $y = ae^{bx}$, $y = ab^{x}$, $y = ax^{b}$ by the method of least squares.		
UNIT-V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER	Lecturer Hours:7Hrs
Taylor's series method, Picard's method, Euler's and modified Euler's Method, Runge-Kutta method of fourth order, Predictor and Corrector methods: Milne's method, Adams-Bashforth-Moulton method		

Text Books:

1.B.S. Grewal, *Higher Engineering Mathematics*, 43rd Edition, Khanna Publishers, New Delhi, 2014.

2. S.S. Sastry, *Introductory Methods of Numerical Analysis*, Fifth Edition, PHI Learning Pvt. Ltd, New Delhi, 2012.

Reference Books:

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

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Title of the course:	**MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS**			
Branches for which this course is offered:	**ME - III SEMESTER**	L	T	C
		3	0	3

COURSE OVERVIEW:
The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Understand, Concepts of economics, managerial economics, scope, nature and importance of managerial economics, demand determinants, law of demand and its exceptions.
CO2	Understand elasticity of demand, types and measurement of elasticity of demand, demand forecasting, methods of demand forecasting.
CO3	Understand production function, isoquants and isocosts, MRTS, least cost combination of inputs, Cobb-Douglas production function and law of return to scale. Types of cost, BEA, BEP.
CO4	Understand market structure, types of markets, price-output determination under perfect competition, monopoly, monopolistic competition and pricing methods.
CO5	Understand types of business organizations and LPG.
CO6	Understand capital, types, sources, estimation of capital requirements, capital budgeting and techniques of capital budgeting.

Course Content:		
Unit-I	INTRODUCTION TO MANAGERIAL ECONOMICS	LECTURE HOURS: 9
Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. –Inflation-Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.		
Unit-II	THEORY OF PRODUCTION AND COST ANALYSIS	LECTURE HOURS: 9
Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and ISO -costs, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - Cost Analysis: Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.GST-Impact.		
Unit-III	INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT	LECTURE HOURS: 10

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship-Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment-Economic Liberalization – Privatization – Globalization-National Income- GDP-monetary policy-Fiscal Policy		
Unit-IV	INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS	LECTURE HOURS: 10
Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).		
Unit-V	CAPITAL AND CAPITAL BUDGETING	LECTURE HOURS: 10
Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)		

Text Books:	
1	Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2	Financial Management, I.M.Pandey, Vikas Publications, 2013.

Reference Books:	
1	Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2	Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.
3	Accounting and Financial Mangement, T.S.Reddy & Y. Hariprasad Reddy, Margham Publishers.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**THERMODYNAMICS**			
Branches for which this course is offered:	**ME – III SEMESTER**	L	T	C
		3	1	4

Course Overview:
Thermodynamics is the field of physics that deals with the relationship between heat and work in a substance during different types of thermodynamic processes. Specifically, thermodynamics focuses largely on how a heat transfer is related to various energy changes within a system undergoing a thermodynamic process. Such processes usually result in work being done by the system and are guided by the laws of thermodynamics. The course is extended to study the properties of pure substance and also the analysis of power and refrigeration cycles.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the concepts on thermodynamic property, cycle, constraints of equilibrium, reversibility and energy transfer in the form of Work and Heat with various applications
CO2	Understand the how energy transformation occurs from one form into another form in open and closed systems and applying steady flow energy equation and mass balance equation to various applications
CO3	Understand the Nozzle, Diffuser, Throttling device, Turbine and compressor in laboratories or local industries and understand their working principles practically.
CO4	Understand the major difference in working of a heat engine, refrigerator and heat pump. to calculate the maximum efficiency of a cycle. Also student can learn calculating entropy change for aprocess, maximum available energy.
CO5	Understand the method drawing phase equilibrium diagrams like P-v, h-s, T-s and P-T of a pure substance
CO6	Understand the basic laws of ideal gas and gas mixtures and power cycles.

Course Content:		
Unit – I	BASIC CONCEPTS	Lecture Hours: 12
BASIC CONCEPTS: Macroscopic and Microscopic Approaches, Thermodynamic System, State, Property, Process and Cycle, Thermodynamic Equilibrium, Quasi-static Process, Zeroth Law of Thermodynamics, WORK & HEAT TRANSFER: Work transfer, types of work transfers, Point and Path Functions, Heat transfer, Comparison of Work and Heat transfers.		
Unit – II	FIRST LAW OF THERMODYNAMICS	Lecture Hours: 12
FIRST LAW OF THERMODYNAMICS: First Law applied to a process and a cycle, Energy - a		

property, Forms and transformation of Energy, Internal Energy and Enthalpy, PMM I.
FLOW SYSTEMS: Control Volume, Steady Flow Process, Mass balance and Energy Balance, Applications of Steady Flow Processes.

Unit – III	SECOND LAW OF THERMODYNAMICS	Lecture Hours: 12

Heat Engine, Statements of Second law and their equivalence, Refrigeration and Heat Pump, Reversibility and Irreversibility, Carnot cycle and Carnot's Theorem, Thermodynamic Temperature Scale, Efficiency of Heat Engine, PMM II
Entropy: Clausius' Theorem, Entropy as a property, T-s Plot, Clausius Inequality, Principle of Entropy Increase and its applications. Available Energy, Quality of Energy, definitions of Dead state, Availability.

Unit – IV	PURE SUBSTANCES	Lecture Hours: 12

P-v, P-T, T-s diagrams of Pure Substances, Mollier Diagram, Dryness Fraction, Use of Steam Tables for Thermodynamic Properties
Thermodynamic Relations: Maxwell's equations, TDS equations, Joule-Kelvin Effect, Clausius-clapeyron equation

Unit – V	MIXTURES OF PERFECT GASES & POWER CYCLES	Lecture Hours: 12

Properties of Gases and Gas Mixtures: Ideal Gas, Equation of State, Avogadro's Law, Internal Energy and Enthalpy of Ideal Gas, Entropy Change of Ideal Gas, Mixture of Gases- Dalton's Law of Partial Pressure , Specific Heats, Internal Energy and Enthalpy of Gas Mixtures
Gas Power Cycles: Carnot Cycle, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, their applications, comparison of Otto, Diesel and Dual cycles, Second Law Analysis of Gas Power Cycles

Text Books:	
1	P. K. Nag, "Engineering Thermodynamics", Tata McGraw Hill, 4th Edition, 2008.
2	YunusCengel, Michael A. Boles, "Thermodynamics-An Engineering Approach", Tata McGraw Hill, 7th Edition, 2011.
3	R. K. Rajput (2010), A text book of Engineering Thermodynamics, Fourth Edition, Laxmi Publications, New Delhi, India
Reference Books:	
1	J. B. Jones, R. E. Dugan, "Engineering Thermodynamics", Prentice Hall of India Learning, 1st Edition, 2009.
2	Y. V. C. Rao, "An Introduction to Thermodynamics", Universities Press, 3rd Edition, 2013.
3	K. Ramakrishna, "Engineering Thermodynamics", Anuradha Publishers, 2nd Edition, 2011.
4	Holman. J.P, "Thermodynamics", Tata McGraw Hill, 4th Edition, 2013.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**ENGINEERING MECHANICS**			
Branches for which this course is offered:	**III SEMESTER**	L	T	C
		3	1	4

Course Overview:
Engineering Mechanics is the branch of science for analyzing force systems that acts upon the bodies at either at rest or in motion. The knowledge of mechanics helps us in designing the various parts of machine elements. The course content is designed in such a way that the balancing of various mechanical systems could be achieved by the calculations of center of gravity and moment of inertia. The effects of friction and the consequences of frictional forces on the mating parts will be analyzed to design various systems with negligible effort loss.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	To analyze the basic concepts of rigid bodies subjected to different types of loads and supports.
CO2	To analyze the motion of the bodies considering friction and external loads.
CO3	To determine Centroids and area moment of inertia and centre of gravity and mass moment of inertia of simple and composite figures.
CO4	To analyse the motion of particle without considering forces and considering forces
CO5	To analyze the perfect frames using method of joints, method of sections & tension coefficient method for vertical , horizontal and inclined loads and concepts of Mechanical vibrations. (Simple, compound and torsional pendulums)
CO6	To analyse the motion of particle with and without considering forces

Course Content:		
Unit – I	INTRODUCTION OF ENGINEERING MECHANICS	Lecture Hours: 12
Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams – Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.		
Unit – II	COPLANAR FORCE SYSTEMS &FRICTION	Lecture Hours: 12
Coplanar Force Systems - Introduction – Equilibrium equations – All systems, Problems on Coplanar Concurrent force system, Coplanar Parallel force system, Coplanar General force system – Point of action, Method of joints, Method of sections, Method of sections, Method of members, Friction – Coulombs laws of dry friction – Limiting friction, Problems on Wedge friction, Belt Friction-problems.		

Unit – III	CENTROID, CENTER OF GRAVITY & MOMENT OF INERTIA	Lecture Hours: 12
Centroid: Centroids of simple figures and Composite figures. center of gravity Moment of Inertia– Area & Mass M.I – Radius of Gyration, Parallel axis– Perpendicular axis theorem – Simple Problems.		
Unit – IV	DYNAMICS OF PARTICLES	Lecture Hours: 12
Dynamics of Particles - Rectilinear Motion – Kinematics Problems, Kinetics – Problems, Work & Energy – Impulse Moment, Direct Central Impact – coefficient of restitution, Curvilinear Motion – Projectile Motion, Work & Energy in Curvilinear motion.		
Unit – V	FRAMES AND VIBRATIONS	Lecture Hours: 12
Analysis of Perfect Frames: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads. Mechanical Vibrations: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple, Compound and Torsional pendulum- Numerical problems		

Text Books:	
1	Engineering Mechanics by Jayakumar, Kumar, PHI, 2014
2	Singer's Engineering Mechanics Statics and Dynamics,Vijay Kumar Reddy, Suresh Kumar. BS Publications 2015
3	Engineering Mechanics – B. Bhattacharyya, Oxford University Publications, 2015
Reference Books:	
1	Engineering Mechanics by Seshigiri Rao, Rama Durgaiah, Universities Press, 2005
2	Engineering Mechanics by Shames & Rao – Pearson Education.
3	Engineering Mechanics by Fedrinand L.Singer – Harper Collings Publishers

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**ENGINEERING DRAWING FOR MECHANICAL ENGINEERS**			
Branches for which this course is offered:	**ME – III SEMESTER**	L	T/P	C
		2	2	3

Course Overview:
• The aim of this course is to enhance the student's knowledge and skills in engineering drawing of solids, sections of solids, development of solids with interpenetration of solids and to present isometric and perspective projections. • 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, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Visualize and draw solids and sections of solids **.**
CO2	Draw the development of sectioned solids.
CO3	Draw the isometric views of solids and objects.
CO4	Convert pictorial views into Orthographic views.
CO5	Visualize and draw intersection curves when two solids intersect each other.
CO6	Understand the concept of perspective projection and to draw perspective projections of simple figures and solids

Course Content:		
Unit – I	SECTIONAL PLANES, SECTIONAL VIEWS AND DEVELOPMENTS OF SECTIONED SOLIDS	Lecture Hours: 15
Importance of Sectional views. Sectional View of Right Regular Solids like cylinder, Prism, Pyramid and Cone. Finding the True shapes of the sections. Development of Surfaces of sectional solids		
Unit – II	ISOMETRIC PROJECTIONS OF SECTIONAL SOLIDS	Lecture Hours: 12
Importance of Isometric views, Isometric views of regular solids like cylinder, Prism, Pyramid and Cone and isometric projections of Sectional views of these Solids.		

Unit – III	CONVERSION OF ISOMETRIC VIEWS TO ORTHOGRAPHIC VIEWS	Lecture Hours: 9
Conversion of Isometric views to orthographic views and Conventions.		
Unit – IV	INTERPENETRATION OF RIGHT REGULAR SOLIDS	Lecture Hours: 12
Importance of intersection curves ,Projections of Curves of intersection of Cylinder and Cylinder, Cylinder and Prism, Square Prism and Square Prism		
Unit – V	PERSPECTIVE PROJECTIONS	Lecture Hours: 12
Importance of Perspective Projection, Perspective Projection of Plane Figures and simple Solids by using Visual Ray Method and Vanishing point method		

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

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**APPLIED MECHANICS LABORATORY**			
Branches for which this course is offered:	**ME – III SEMESTER**	L	T	C
		3	0	1.5

Course Overview:
This lab is aimed at making the student understand the concepts of Engineering Mechanics through demonstrable experiments

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Acquire knowledge of static and dynamic behavior of the bodies.
CO2	Acquire the knowledge, so that they can understand physical phenomenon with the help of various theories.
CO3	Explain the physical phenomenon with help of diagrams.
CO4	with broad vision with the skills of visualizing and developing their own ideas, and to convert those ideas in to engineering problems and solving those problems with the acquired knowledge of the Engineering mechanics
CO5	Apply the principles of mechanics to analyze structural and machine elements.
CO6	Identify the different types of beams and the types of loading. Derive expressions to determine the bending stress, deflection and shear stress in beams subjected to various types loading.

Course Content:		
Experiment-I	**Polygon Law of Coplanar Forces** To verify the Polygon Law of Coplanar Forces for a concurrent force system	Lecture Hours: 3
Experiment -II	**Support Reactions of a Beam** To find experimentally the reactions at the supports of a simply supported beam and verify the same with analytical values	Lecture Hours: 3
Experiment -III	**Bell Crank Lever** To verify the Principle of moments using the Bell Crank lever apparatus	Lecture Hours: 3

Experiment -IV	**Friction Plane** To determine the coefficient of Static Friction between two surfaces	Lecture Hours: 3
Experiment -V	**Moment of Inertia of Flywheel** To find screw jack and determine the coefficient of friction between the threads of the screw	Lecture Hours: 3
Experiment -VI	**Compound Pendulum** To estimate the acceleration due to gravity using a compound pendulum	Lecture Hours: 3
Experiment -VII	**Single Gear Crab** To understand the gear arrangement and establish the law of machine	Lecture Hours: 3
Experiment -VIII	**Double Gear Crab** To compare the efficiency of Single and Double Gear Crab	Lecture Hours: 3
Experiment -IX	**Differential Pulley Block** To establish law of machine	Lecture Hours: 3
Experiment -X	**Differential Axle and Wheel** To understand the velocity ratio of the machine and to interpret the law of machine	Lecture Hours: 3

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**COMPUTER AIDED DRAFTING LAB**			
Branches for which this course is offered:	**ME – III SEMESTER**	L	T	C
		3	0	1.5

Course Overview:
Computer Aided Drafting is a process of preparing a drawing of an object on the screen of a computer. There are various types of drawings in different fields of engineering and sciences. In the fields of mechanical engineering, the drawings of machine components and the layouts of them are prepared.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	To make the students understand and interpret drawings of machine components so as to prepare assembly drawings either manually and using standard CAD packages.
CO2	To familiarize the students with Indian Standards on drawing practices and standard components.
CO3	To gain practical experience in handling 2D drafting and 3D modeling software systems.
CO4	To outline the basic principles associated with CADD and to demonstrate common drafting techniques and shortcuts used by professionals.
CO5	Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings
CO6	Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program

Course Content:		
Experiment-I	Exercise on usage of Auto Cad Commands with Absolute co-ordinate system	Lecture Hours: 3
Experiment -II	Exercise on usage of Auto Cad 2D Commands with Relative co-ordinate system	Lecture Hours: 3
Experiment -III	Exercise on usage of Auto Cad 2D Commands with polar Co-ordinate system	Lecture Hours: 3

Experiment -IV	Exercise on usage of Auto Cad on 2d editing commands	Lecture Hours: 3
Experiment -V	Creation of Simple Figures Like Polygon And General Multiline Figures.	Lecture Hours: 3
Experiment -VI	Drawing of A Title Block With Necessary Text And Projection Symbol	Lecture Hours: 3
Experiment -VII	Drawing of Curves Like Parabola, Spiral, Involute Using B-spline or Cubic Spline	Lecture Hours: 3
Experiment -VIII	Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone etc and dimensioning	Lecture Hours: 3
Experiment -IX	Drawing sectional views of prism, pyramid, cylinder, cone	Lecture Hours: 3
Experiment -X	Drawing front view, top view and side view of objects from the given pictorial views	Lecture Hours: 3
Experiment -XI	Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model	Lecture Hours: 3
Experiment -XII	Drawing isometric projection of simple object	Lecture Hours: 3
Experiment -XIII	Drawing Of Sectional View Of Cone	Lecture Hours: 3
Experiment -XIV	Drawing Of Sectional View Of Prism	Lecture Hours: 3
Experiment –XV	Drawing Front View, Top View And Side View Of Objects From The Given Pictorial Views	Lecture Hours: 3
Experiment –XVI	Creation Of 3-D Models Of Simple Objects And Obtaining 2-D Multi view Drawings From 3-D Model	Lecture Hours: 3
Experiment –XVII	Drawing isometric projection of Simple object	Lecture Hours: 3

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
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Title of the Course:	**BASIC MEASUREMENTS LAB**			
Branches for which this course is offered:	**ME – III SEMESTER**	L	T	C
		2	0	1

Course Overview:
Function, operation, and application of common mechanical engineering instruments, measurement principles, and statistical analysis.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the basic measurement units and able to calibrate various measuring devices.
CO2	Express error and correction factors of various measuring devices
CO3	Use measuring tools such as Sine Bar, Sine Center, Bevel Protractor etc.
CO4	Understand the theoretical concepts taught in Mechanical Measurements.
CO5	Understand and use various measuring tools
CO6	Understand calibration of various measuring devices

Course Content:		
Experiment-I	Measurement of bores by internal micrometers	Lecture Hours: 2
Experiment -II	Measurement of bores by Dial bore indicators	Lecture Hours: 2
Experiment -III	Use of gear teeth vernier calipers and checking the chordal addendum of spur gear.	Lecture Hours: 2
Experiment -IV	Use of gear teeth vernier calipers and checking chordal height of spur gear	Lecture Hours: 2
Experiment -V	Angle measurements by Bevel protractor.	Lecture Hours: 2
Experiment -VI	Taper measurements by Bevel protractor	Lecture Hours: 2

Experiment -VII	Angle measurements by spirit level	Lecture Hours: 2
Experiment -VIII	Taper measurements by spirit level	Lecture Hours: 2
Experiment -IX	Use of sprit level in finding the flatness of surface plate	Lecture Hours: 2

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**QUANTITATIVE APTITUDE -1**			
Branches for which this course is offered:	**ME - III SEMESTER**	L	T	C
		2	0	0

Course Content:		
Unit – I	RATIO AND PROPORTION AND AVERAGE, MIXTURES AND ALLEGATION	Lecture Hours: 7
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: 7
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: 7
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: 7
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: 7
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

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

(AUTONOMOUS)

Course Structure for II B.Tech – R18 Regulations

MECHANCIAL ENGINEERING

IV SEMESTER									
Course Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1313	Mechanics of Solids	PC	3	1	0	4	30	70	100
A1314	Thermal Engineering – I	PC	3	1	0	4	30	70	100
A1315	Kinematics of Machines	PC	3	1	0	4	30	70	100
A1316	Manufacturing Technology	PC	3	0	0	3	30	70	100
A1317	Machine Drawing	PC	2	0	2	3	30	70	100
A1318	Mechanics of Solids Lab	PC	0	0	3	1.5	30	70	100
A1319	Thermal Engineering Laboratory	PC	0	0	3	1.5	30	70	100
A1320	Manufacturing Technology Laboratory	PC	0	0	2	1	30	70	100
A1013	Verbal Ability and Logical Reasoning	HS	1	0	0	1	30	70	100
A1321	Comprehensive Online Examination		0	0	0	1	-	100	100
	TOTAL		17	03	10	24	270	730	1000

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**MECHANICS OF SOLIDS**			
Branches for which this course is offered:	**ME – IV SEMESTER**	L	T	C
		3	1	4

Course Overview:
The objective of the subject is to learn the fundamental concepts of stress, strain and deformation of solids with applications to bars and beams. The students shall understand the theory of elasticity including strain/displacement and hooks law relationships. To accesses stresses and deformations through the mathematical models of beams for bending and bars for twisting or combination of both. The knowledge of this subject will help in the design & Theory of machines courses.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Determine stress strain relationship subjected to axial, bending and torsional loads
CO2	Calculate shear and bending moment in simply supported beams, cantilever beams and overhanging beams.
CO3	Calculate slope and deflection of beams subjected to loads.
CO4	Calculate the shear stress distribution across different sections.
CO5	Analyse strength of beams and sections and calculate flexural and shear stress.
CO6	Analyse and design Thick and Thin cylinders.

Course Content:		
Unit – I	SIMPLE STRESSES AND STRAINS	Lecture Hours: 12
Elasticity and plasticity – Types of stresses & strains – Hooke's law – stress & strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings. Principle stresses and strains-computation of principle stresses and strains on inclined planes-theory of failures- minimum principle stress, strain, shear stress and strain energy theories.		
Unit – II	SHEAR FORCE AND BENDING MOMENT	Lecture Hours: 12
Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L.,		

uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.		
Unit – III	FLEXURAL STRESSES	Lecture Hours: 12
FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis –Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections, crane hooks. SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I , T angle sections, shear centre.		
Unit – IV	DEFLECTION OF BEAMS	Lecture Hours: 14
TORSION OF CIRCULAR SHAFTS- Theory of pure torsion- Derivation of torsion equations; T/J=q/r=Nθ/L – Assumptions made in the theory of pure torsion- torsional moment of resistance-polar section modulus. DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.		
Unit – V	THIN AND THICK CYLINDERS	Lecture Hours: 10
THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells. THICK CYLINDERS: Lame's equation – cylinders subjected to inside & outside pressure - compound cylinders.		

Text Books:	
1	Strength of Materials by R.Subramaniam, oxford publishers.
2	Strength of Materials by R.K. Bansal, Laxmi Publishers, 5th Edition,2012.
3	Mechanics of Materials,Andrews Pytel,Jaan Kiusallaas & M.M.M.Sarcar (Second Edition),Cengage Learning Publishers.
Reference Books:	
1	Strength of Materials by S. Ramamrutham, Dhanpat Rai Publishers
2	Strength of Materials by R.K. Rajput, S.Chand& Company, 5th Edition,2012
3	Strength of Materials by Dr. Sadhu Singh, Khanna Publishers, 10th Edition,2013

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**THERMAL ENGINEERING – I**			
Branches for which this course is offered:	**ME - IV SEMESTER**	L	T	C
		3	1	4

Course Overview:
The course overview is to impart the knowledge of engine components, working principles of IC engines, auxiliary systems, the combustion aspects of SI and CI engines in addition to the methods of improving performance. The students shall become aware on the latest developments in the field of IC engines like MPFI , CRDI etc. and also shall become familiar about the working of Reciprocating and Rotary Compressors, boilers, condensers, turbines. The student also shall apply the thermodynamic concepts in IC engines and compressors.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the concepts of the working of both S.I & C.I engines with the help of indicator diagrams
CO2	Understand the concepts of the working of both S.I & C.I engines with the help of valve and port timing diagrams
CO3	understand the fuel supply systems, cooling, lubrication and ignition systems
CO4	Understand the flame propagation inside cylinder, stages of combustion in S.I and C.I engines and knocking phenomenon in combustion process.
CO5	Understand various parameters of engine and methods to measure them and methods to increase the engine performance.
CO6	Understand the working of rotary air compressors and reciprocating air compressors

Course Content:		
Unit – I	IC ENGINES	Lecture Hours: 13
Definition of Engine And Heat Engine, I.C Engine Classification – Parts of I.C.Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C.Engines SI & CI Engines, Valve and Port Timing Diagrams.		
Unit – II	FUEL SYSTEM, COOLING & LUBRICATION SYSTEMS, IGNITION SYSTEM	Lecture Hours: 12
Fuel System: S.I. Engine: Fuel Supply Systems, carburetor types Air Filters, Mechanical and Electrical Fuel Pump – Filters– Types of fuel Injection Systems.. Cooling & Lubrication Systems: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo Siphon, Water And Forced Circulation System; Lubrication Systems-Flash, Pressurized and Mist Lubrication. Ignition System: Function Of An Ignition System, Battery coil Ignition System, Magneto Coil Ignition System, Electronic Ignition System using Contact Breaker, Electronic Ignition using Contact Triggers – Spark Advance And Retard Mechanism.		

Unit – III	FUELS AND COMBUSTION	Lecture Hours: 12
S I engine :Normal Combustion and Abnormal Combustion – Importance of Flame Speed and Effect of Engine Variables – Type of Abnormal Combustion, Pre-Ignition and Knocking (Explanation) – Fuel Requirements and Fuel Rating, Anti Knock Additives, Types of Combustion Chambers. C.I. Engines: Stages Of Combustion – Delay Period And Its Importance – Effect Of Engine Variables – Diesel Knock– Types of Combustion Chambers (DI And IDI), Fuel Requirements And Fuel Rating.		
Unit – IV	TESTING AND PERFORMANCE	Lecture Hours: 12
Testing and Performance : Parameters of Performance - Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition, Brake Power – Determination of Frictional Losses And Indicated Power – Performance Test – Heat Balance Sheet and Chart..		
Unit – V	AIR COMPRESSORS	Lecture Hours: 11
Reciprocating Compressors, Effect of Clearance volume in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors, Problems Related to Reciprocating Compressors, Working principles of Roots blower, Vane type Blower, Centrifugal Compressor - Axial Flow Compressors, Working Principle of Rotary Compressors.		

Text Books:	
1	V. Ganesan, “I.C. Engines”, Tata McGraw Hill, 3rd Edition, 2011.
2	B. John Heywood, “Internal Combustion Engine Fundamentals”, Tata McGraw-Hill, 2nd Edition, 2011.
3	R.K. Rajput, “Thermal Engineering”, Lakshmi Publications, 1st Edition, 2011
Reference Books:	
1	Mathur, Sharma, “IC Engines”, Dhanpat Rai & Sons, 3rd Edition, 2008.
2	Pulkrabek, “Engineering Fundamentals of IC Engines”, Pearson Education, 2nd Edition, 2008.
3	Rudramoorthy, “Thermal Engineering”, Tata McGraw-Hill, 5th Edition 2003.
4	C. P. Arora, “Refrigeration and Air Conditioning”, Tata McGraw-Hill Education, 3rd Edition

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**KINEMATICS OF MACHINERY**			
Branches for which this course is offered:	**ME – IV SEMESTER**	L	T	C
		3	1	4

Course Overview:
The objective of this course is to cover the kinematics and dynamics of planar single degree of freedom mechanisms. After this course the student should have general mathematical and computational skills to enable the kinematics and dynamics analysis of machine elements including linkages, cams and gears and also becomes familiar with gear terminology and drawing of the cam profiles.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Explain the various links of machines and mechanisms and find out difference between Machine and mechanism
CO2	Explain the various mechanisms used in machines
CO3	Understood different types of Steering mechanisms
CO4	Identify new and different mechanisms
CO5	Analyzed the motion of gears for various mechanisms
CO6	Learned different types of GEAR TRAINS

Course Content:		
Unit – I	MECHANISMS AND MACHINES	Lecture Hours: 12
Elements or Links – Classification – Rigid Link, flexible and fluid link. Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained. Mechanisms and machines – classification of mechanisms and machines – kinematic chain – inversion of mechanisms – inversions of quadric cycle chain – single and double slider crank chain. Mobility of mechanisms. Straight Line Motion Mechanisms- Exact and approximate, copiers and generated types –Peaucellier, Hart and Scott Russel – Grasshopper, Watt, Tchebicheff and Robert Mechanisms. Pantograph.		
Unit – II	STEERING MECHANISMS	Lecture Hours: 12
STEERING MECHANISMS: Conditions for correct steering – Davis Steering gear, Ackermanns steering gear. Hooke's Joint (Universal coupling) -Single and double Hooke's joint — applications – Simple problems.		

Belt, Rope and Chain Drives : Introduction, Belt and rope drives, selection of belt drive- types of belt drives, materials used for belts and ropes, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains-length, angular speed ratio, classification of chains.		
Unit – III	KINEMATICS	Lecture Hours: 12
Velocity and Acceleration Diagrams- Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration – Graphical method – Application of relative velocity method – Slider crank mechanism, four bar mechanism. Acceleration diagrams for simple mechanisms, Coriolis acceleration, and determination of Coriolis component of acceleration. Kleins construction. Analysis of slider crank mechanism for displacement, velocity and acceleration of slider using analytical method Instantaneous Centre Method: Instantaneous centre of rotation, centrode and axode – relative motion between two bodies – Three centres in-line theorem – Locating instantaneous centres for simple mechanisms and determination of angular velocity of points and links.		
Unit – IV	GEARS AND GEAR TRAINS	Lecture Hours: 14
Gears: Classification, Terminology, Law of Gearing, Interferences, methods of avoiding interferences, path of contact, arc of contact. Gear trains: Simple gear train, compound gear train, reverted gear train, planetary/epicyclic gear train, Sun and planet gear		
Unit – V	CAMS AND FOLLOWERS	Lecture Hours: 10
CAMS: Definitions of cam and follower – uses – Types of followers and cams – Terminology. Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes. Drawing of cam profiles. ANALYSIS OF MOTION OF FOLLOWERS: Tangent cam with roller follower – circular arc (Convex) cam with flat faced and roller follower.		

Text Books:	
1	Theory of Machines, S.S. Rattan, Tata McGraw Hill Publishers, 3rd Edition,2013.
2	Kinematics and dynamics of machinery, R.L Norton ,Tata McGraw Hill Publishers,1st Edition, 2009.
Reference Books:	
1	Theory of Machines and Mechanisms, 3rd Edition, J.E. Shiegley et. al, Oxford International Student Edition.
2	The theory of Machines, Ballaney, Kanna Publishers
3	Theory of Machines, Thomas Bevan, Pearson (P) 3rd Edition, 2012.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**MANUFACTURING TECHNOLOGY**			
Branches for which this course is offered:	**ME – IV SEMESTER**	L	T	C
		3	0	3

Course Overview:
This subject the students will understand how manufacturers use technology to change raw materials into finished products. The students shall also introduce the basic concepts of casting, pattern preparation, gating system and knowledge on basic features of various welding and cutting processes. And also to study the concepts of surface treatment process, their characteristics and applications.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Able to understand the elements of casting, construction of patterns and gating systems, moulds, methods of moulding, moulding machines and solidification of castings of various metals.
CO2	Able to understand the different types of special casting methods and their applications
CO3	Able to design of risers and feeding systems, crucible melting, cupola operation and steel making process. The students may also be able to design a casting process on their own
CO4	To understand the different types of welding processes, welds and weld joints, their characteristics, cutting of ferrous and non-ferrous metals by various methods.
CO5	To understand about advanced welding process, heat affected zone(HAZ), Defects and Identification Methods
CO6	To understand the various surface treatment processes

Course Content:		
Unit – I	CASTING	Lecture Hours: 10
Introduction, Steps involved in making a casting, Patterns and Pattern making: Types of patterns, Materials used for patterns, Pattern allowances, Moulding sand: Molding sand composition, Testing sand properties, Sand preparation. Core: Core sands, Types of cores, Core prints, Chaplets, Forces acting on the molding flasks, Principles of Gating, Gating ratio and Design of Gating systems, Core, Core print. Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys.		
Unit – II	SPECIAL CASTING PROCESSES	Lecture Hours: 10
Special casting processes: Centrifugal, Die, Investment, CO_2 Molding. Casting defects, Causes and remedies. Risers – Types, function and design, casting design considerations		

Methods of Melting: Crucible melting and cupola operation, steel making processes. Casting inspection and defects.		
Unit – III	WELDING	Lecture Hours: 10
Classification of welding processes types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding. Cutting of Metals: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.		
Unit – IV	INERT GAS WELDING	Lecture Hours: 10
Mechanics, characteristics, process parameters, applications of Inert Gas welding, TIG & MIG welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing and adhesive bonding. Heat affected zones in welding; welding defects – causes and remedies – destructive and nondestructive testing of welds.		
Unit – V	SURFACE ENGINEERING	Lecture Hours: 05
Surface treatment processes and their characteristics and applications. (a) Overlay coatings (b) Diffusion coatings (c) Thermal or mechanical modification of surfaces.		

Text Books:	
1	Manufacturing Technology, Vol I P.N. Rao, Tata Mc Graw Hill, 4th Edition,2013
2	Manufacturing Technology, Kalpakjain, Pearson education, 4th Edition,2002
3	Production Technology, K.L Narayana, I.K. International Pub, 3rd Edition,2013

Reference Books:	
1	Manufacturing Process Vol. I, H.S.Shah Pearson, 2013,
2	Principles of Metal Castings, Rosenthal, Tata Mc Graw Hill ,2nd Edition,2001

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**MACHINE DRAWING**			
Branches for which this course is offered:	**ME – IV SEMESTER**	L	P	C
		2	2	3

Course Overview:
Machine drawing is used to communicate the necessary technical information required for manufacture and assembly of machine components. These drawings follow rules laid down in national and International Organizations for Standards (ISO).Hence the knowledge of the different standards is very essential. Students have to be familiar with industrial drafting practices and thorough understanding of production drawings to make themselves fit in industries.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Able to understand product symbols, weld symbols, pipe joints
CO2	Understand orthographic projections of machine elements. Understand isometric projections of machine elements
CO3	Understand detailed assembly drawings of Plummer block, Tailstock, Welded joints, tool head of shaper
CO4	Gain the basic concepts of Auto- CAD
CO5	Draw the assembly drawing of a Flange coupling ,Draw the assembly drawing of a welded bracket join by stud bolt
CO6	Draw the assembly drawings in Auto- CAD

Course Content:		
Unit – I	REPRESENTATION OF ELEMENTS OF MACHINE DRAWING	Lecture Hours: 10
Conventional representation of Engineering Materials, machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs. Parts not usually sectioned.		
Unit – II	COMPONENT DRAWINGS	Lecture Hours: 10
Bolts and Nuts, Locking devices, Keys and Cotter joints, Knuckle Joint, Revitted joints, Shaft Couplings, Bearings and joints		
Unit – III	ASSEMBLY DRAWING PRACTICE	Lecture Hours: 25
Draw the assembly drawings of Engine parts- stuffing boxes, cross heads, Eccentrics, Petrol Engine-connecting rod, piston assembly. Other machine parts- Screw jack, Machine Vice, single tool post. Valves: Steam stop valve, feed check valve. Non return value.		

Text Books:	
1	Machine Drawing – N Siddeswar, P. Kannaiah, VVS Sastry, Mc Graw Hill,2015
2	Machine Drawing- K.L. Narayana, P.Kannaiah & K.Venkata Reddy, New Age Publishers, 4th Edition, 2012.
3	Machine Drawing- P.S. Gill, S.K. Kataria & Sons, 17th Edition, 2012.

Reference Books:	
1	Machine Drawing- Dhawan, S.Chand Publications, 1st Revised Edition,1998.
2	Machine Drawing – Ajeet Singh, McGraw Hill, 2012

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**MECHANICS OF SOLIDS LAB**			
Branches for which this course is offered:	**ME – IV SEMESTER**	L	P	C
		0	3	1.5

Course Overview:
This course introduces students to basic properties of structural materials and behavior of simple structural elements and systems through a series of experiments. Students learn experimental technique, data collection, reduction and analysis, and presentation of results.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Perform the experiment on UTM to determine the young's modulus for ductile materials and analyze the various points on stress strain diagram.
CO2	Calculate the modulus of rigidity of ductile materials and calculate & compare the hardness values for various materials.
CO3	Apply the concept of impact loading and to determine impact values for various materials.
CO4	Perform the experiment on impact test [charpy] and Understand strength of the specimen.
CO5	Perform the experiment on bending test and understand young's modulus and deflection of beam.
CO6	Perform the experiment on torsion test and understand the modulus of rigidity.

Course Content:
1. **Tests on Universal Testing Machine.** a. Tension test b. Compression test c. Shear test d. Bending Test
2. **Bending test on** a. Simple supported beam b. Cantilever beam
3. **Hardness test** a. Brinell's hardness test b. Rockwell hardness test
4. **Impact test** a. Charpy test. b. Izod test.
5. **Test on springs**
6. **Tests on Compression Testing Machine**

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**THERMAL ENGINEERING LAB**			
Branches for which this course is offered:	**ME – IV SEMESTER**	L	P	C
		0	3	1.5

Course Overview:
In this laboratory, students will have the opportunity to study the working principle of IC engines (both SI and CI engines), performance and characteristics in terms of heat balancing, economical speed variations, air fuel ratio influence on the engine to reinforce classroom theory by having the student perform required tests, analyze subsequent data, and present the results in a professionally prepared report. The machines and equipment used to determine experimental data include cut models of 4stroke diesel engine, 2stroke petrol engine, 4stroke and two stroke petrol engines with required specifications, Multi cylinder SI engine, Single cylinder Diesel engine for performance and speed test which is suitable to tests on variable compression ratios.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Understand the concepts on valve timing diagram of SI engine & CI engine.
CO2	Understand the the influence of variations in TDC and BDC operations
CO3	Understand the concept of Calculate the IP,BP, brake thermal efficiency.
CO4	Understand the concept of Calculate& Compare the performance characteristics.
CO5	Understand the method of Experiment on IC engine load variations with Air fuel ratio.
CO6	Understand the basics and able to Analyze the efficiency of reciprocating air compressor

Course Content:		
Experiment-I	Valve / Port Timing Diagrams of an I.C. Engines	Lecture Hours: 3
Experiment -II	Performance Test on a 4 -Stroke Diesel Engines	Lecture Hours: 3
Experiment -III	. Performance Test on 2-Stroke Petrol engine	Lecture Hours: 3

Experiment -IV	Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Engine	Lecture Hours: 3
Experiment -V	Retardation and motoring test on 4- stroke engine	Lecture Hours: 3
Experiment -VI	Heat Balance of an I.C. Engine.	Lecture Hours: 3
Experiment -VII	Air/Fuel Ratio and Volumetric Efficiency of an I.C. Engines.	Lecture Hours: 3
Experiment -VIII	Performance Test on Variable Compression Ratio Engines for CI Engines	Lecture Hours: 3
Experiment -IX	Performance Test on Reciprocating Air – Compressor Unit	Lecture Hours: 3
Experiment -X	Study of Boilers	Lecture Hours: 3
Experiment -XI	Dismantling / Assembly of Engines to identify the parts and their position in an engine.	Lecture Hours: 3
Experiment -XII	Engine Emission Measurement for SI & CI Engines.	Lecture Hours: 3

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**MANUFACTURING TECHNOLOGY LAB**			
Branches for which this course is offered:	**ME – IV SEMESTER**	P	T	C
		2	0	1

Course Overview:
This subject the students will understand how manufacturers use technology to change raw materials into finished products. The students shall also introduce the basic concepts of casting, pattern preparation, gating system and knowledge on basic features of various welding and cutting processes. And also to study the concepts of surface treatment process, their characteristics and applications.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Demonstrate the various foundry and forging operations.
CO2	Illustrate and explain various methods of mould preparation.
CO3	Recognize the importance of basic properties of moulding sand.
CO4	Realize the different methods for determination of sand properties.
CO5	Identify the components of foundry and welding tools and its accessories.
CO6	Read and interpret a given production drawing.

Course Content:		
Experiment – I	METAL CASTING LAB	Lecture Hours: 08
a. Pattern Design and making - for one casting drawing. b. Sand properties testing - Exercise -for strengths, and permeability – 1 c. Moulding: Melting and Casting - 1 Exercise		
Experiment – II	WELDING LAB	Lecture Hours: 08
a. Arc Welding: Lap & Butt Joint - 2 Exercises b. Spot Welding - 1 Exercise c. TIG Welding - 1 Exercise d. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)		
Experiment – III	MECHANICAL PRESS WORKING:	Lecture Hours: 08
a. Blanking & Piercing operation and study of simple, compound and progressive press tool. b. Hydraulic Press: Deep drawing. c. Bending and other operations		

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Title of the Course:	**VERBAL ABILITY AND LOGICAL REASONING**			
Branches for which this course is offered:	**ME – IV SEMESTER**	L	T	C
		1	0	1

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

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

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

COURSE STRUCTURE

V – SEMESTER

V SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1322	Thermal Engineering - II	PC	3	0	0	3	30	70	100
A1323	Dynamics of Machinery	PC	3	1	0	4	30	70	100
A1324	Design of Machine Elements	PC	3	0	0	3	30	70	100
A1325	Fluid Mechanics and Hydraulic Machines	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
A1326	Fluid Mechanics and Hydraulic Machines Laboratory	PC	0	0	3	1.5	30	70	100
A1327	Machine Tools Laboratory	PC	0	0	3	1.5	30	70	100
A1328	Production Drawing Practice	PC	0	0	2	1	30	70	100
A1015	Professional Values & Ethics	MC	2	0	0	0	100*	0	100*
	TOTAL		20	01	08	23	270	630	900

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1322 – THERMAL ENGINEERING-II

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

1. Course Description

Course Overview

This course is designed to provide a sound knowledge in various aspects of thermal equipments. It plays in the vital areas of power generation, Automobiles, Refrigeration and Air-Conditioning, energy sector. It also familiar with steam power plant, boilers, nozzles, gas turbines and jet propulsion.

Course Pre/corequisites

A1307 - Thermodynamics

2. Course Outcomes (COs)

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

A1322.1	Apply power cycles and efficiency enhancement methods to generate power
A1322.2	Calculate the chimney height and draught for maximum discharge
A1322.3	Determine the characteristics of flow through nozzle
A1322.4	Construct the various velocity triangles of steam turbines
A1322.5	Analyze the working principle and performance of various thermal equipment

3. Course Syllabus

UNIT I

Rankine Cycle - Schematic layout, thermodynamic analysis, concept of mean temperature of heat addition and methods to improve cycle performance.

Boilers - Classification based on working principles & pressures of operation, L.P and H.P. boilers, mountings and accessories.

UNIT II

Draught - Classification, height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney and types of draught.

UNIT III

Steam Nozzles - Function of nozzle, flow through nozzles, thermodynamic analysis, exit velocity of nozzle, expansion in nozzle, velocity coefficient, condition for maximum discharge and critical pressure ratio.

Condensers - Classification, air leakage vacuum efficiency and condenser efficiency.

UNIT IV

Steam Turbines - Mechanical details, principle of operation, velocity diagrams, condition for maximum efficiency of steam turbines.

Gas Turbines - Ideal cycle, essential components, parameters of performance, actual cycle, regeneration, inter cooling and reheating, closed and semi-closed cycles.

UNIT V

Jet Propulsion - Working principles with schematic diagrams and representation on T-S diagram, thrust, thrust power and propulsion efficiency.

4. Books and Materials

Text Book(s)

1. R.K. Rajput, *Thermal Engineering*, 8th edition, Lakshmi Publications, 2010

2. V. Ganesan, *Gas Turbines*, Tata McGraw Hill, 3rd edition, New Delhi, 2010

Reference Book(s)

1. P. K. Nag, *Basic and Applied Thermodynamics*, 2nd edition, Tata McGraw Hill, 2012

2. R. Yadav, *Thermodynamics and Heat Engines*, Publishing House, 6th edition, Allahabad, 2002

3. Mahesh M Rathore, *Thermal Engineering*, McGraw-Hill, New Delhi, 2010

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1323 – DYNAMICS OF MACHINERY

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 will provide the knowledge on how to analyse the forces acting on various parts of machines to give required output. This includes relative force analysis and calculation of gyroscopic couples, analysing forces acting on brakes and clutches, considering the effect of friction, balancing of reciprocating and rotating parts of machines.

Course Pre/corequisites

A1003-Engineering physics

A1308-Engineering Mechanics

A1315- Kinematics of Machines

2. Course Outcomes (COs)

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

A1323.1 Apply gyro-principles to stabilize the motion of vehicle.

A1323.2 Analyse the forces of the Flywheel in IC Engine

A1323.3 Estimate the range of speeds of various governors suitable for applications

A1323.4 Solve problems on balancing of rotating masses and reciprocating masses in V-engine and multi cylinder engines

A1323.5 Evaluate the critical speed of the shaft and simple vibration calculations of rotor systems

3. Course Syllabus

UNIT I

Brakes and Dynamometers- Simple block brakes, Band brake, internal expanding brake, braking of vehicle. Dynamometers, absorption and transmission types, General description and methods of operation.

Precession - Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aeroplanes and ships.

UNIT II

Turning Moment Diagrams and Fly Wheels - Turning moment diagrams for steam engine, IC Engine and multi cylinder engine. Crank effort - coefficient of Fluctuation of energy, coefficient of Fluctuation of speed – Fly wheels and their design, Fly wheels for Punching machines.

UNIT III

Governors - Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting, Effort and power.

UNIT IV

Balancing of Rotating Masses - Balancing of rotating masses - single and multiple – single and different planes.

Balancing of Reciprocating Masses - Primary and secondary balancing of reciprocating masses. graphical methods of unbalanced forces and couples of multi-cylinder and V-engine.

UNIT V

Vibration - Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds, simple problems on free, forced and damped vibrations. torsional vibrations, two and three rotor systems.

4. Books and Materials

Text Book(s)

1. S S.Rattan. *Theory of Machine* , MGH Publishers, 3rd edition,*2013.*
2. R.L.Norton*, Kinematics and Dynamics of Machinery,* Tata McGraw Hill, *2011.*

Reference Book(s)

1. Thomos Bevan. *Theory of Machines,* Pearson education, 3rd edition, *2012.*
2. R.S.Khurmi and Guptha, *Theory of Machines,* Chand publications, New Delhi, 2016
3. J.E. Shiegley, *The theory of Machines,* McGraw Hill, 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1324 – Design of Machine Elements

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 focuses on designing various machine components by undergoing related theory like design process, stress, strain and theories of failures. This knowledge enables the students to design various mechanical components like joints, couplings, shafts and keys under different loading conditions.

Course Pre/corequisites

A1308 - Engineering Mechanics

A1313 - Mechanics of Solids

A1317 - Machine Drawing

2. Course Outcomes (COs)

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

A1324.1 Apply the design process and theories of failure for designing different machine elements.

A1324.2 Solve the problems related to simple and complex components under different loads using Goodman's and Soderberg's criteria.

A1324.3 Estimate the stress induced in riveted and bolted joints under different load conditions

A1324.4 Analyze the failures in shafts, cotter joint and knuckle joint subjected to various loads.

A1324.5 Design the keys, rigid and flexible couplings as per the standards suitable to applications.

3. Course Syllabus

UNIT I

Introduction - General considerations of design, Design process, selection of engineering materials, properties, stress and strains, Limits and fits, theories of failures.

UNIT II

Design for Fluctuating Loads - Stress concentration, notch sensitivity, design for fluctuating stresses, estimation of endurance strength, Goodman's line, Soderberg's line, design of components for finite and infinite life.

UNIT III

Design of Riveted Joints - Types of riveted joints, design of riveted joints. Boiler shell riveting design and eccentric loading design of riveted joints.

Design of Bolted Joints - Forms of screw threads. Stress in screw fasteners. Design of bolts with pre-stresses, design of bolted joints under eccentric loading, bolts of uniform strength.

UNIT IV

Design of Shafts - Design of solid and hollow shafts for strength and rigidity, design of shafts for combined bending and axial loads.

Design of cotters and knuckle joints - Design of cotter joints - spigot and socket, sleeve and cotter, Design of knuckle joint

UNIT V

Design of Keys- Introduction, types, stresses in keys and design of keys.

Design of couplings - Design of muff, split muff, flange couplings and flexible couplings.

4. Books and Materials

Text Book(s)

Bhandari. V B. *Design of Machine Elements*, 3/e, New Delhi, Tata McGraw Hill Book Company, 2009.

Reference Book(s)

1. R.S. Kurmi and J.K. Gupta, *Machine Design*, New Delhi, S.Chand Publishers, 2005
2. Joseph E.Shigely, *Mechanical Engineering Design*, New Delhi, TMH Publishers, 9th edition, 2011
3. S. Md. Jalaludeen, *Design Data Hand Book*, First Edition, Anuradha Publications, 2009. [Prescribed Data Book]

NOTE: Prescribed Data Book is permitted to carry for examinations.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1325 – FLUID MECHANICS & HYDRAULIC 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

This course deals with the basic principles of fluid mechanics, various types of flows, boundary layer concepts and flow through the pipes. In addition, this course provides knowledge about hydraulic turbines and pumps. The student should be able to develop theoretical capabilities, so that they can apply the knowledge gained in this course to solve complex engineering problems.

Course Pre/corequisites

A1308- Engineering Mechanics

2. Course Outcomes (COs)

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

A1325.1 Analyze properties of fluids under different conditions

A1325.2 Identify the fluid flow patterns using different equations

A1325.3 Determine fluid flow using devices and principles of fluid mechanics

A1325.4 Apply boundary layer concepts to various types of flow and forces exerted by jet on vanes

A1325.5 Estimate the performance of hydraulic turbines and pumps for various design considerations

3. Course Syllabus

UNIT I

Fluid Statics- Dimensions, units and Physical properties of fluids and their influence on fluid motion, atmospheric, gauge and vacuum pressure.

Measurement of pressure - Piezometer, u-tube and differential manometers, hydrostatic forces on a plane area, buoyancy, centre of buoyancy, meta-centre and meta-centre height.

UNIT II

Fluid Kinematics - Stream line, path line, streak line and stream tube, classification of flows, equation of continuity for one dimensional flow.

Fluid Dynamics - surface and body forces, Euler's and Bernoulli's equations for flow along a stream line, momentum equation, its application and force on pipe bend.

UNIT III

Closed Conduit Flow - Laminar and turbulent flow through pipes, Reynolds experiment, significance of Reynold's number, formulae for laminar flow through circular pipes.

Turbulent flow - Darcy Weisbach equation, minor losses in pipes, pipes in series and pipes in parallel, total energy line-hydraulic gradient line and measurement of flow

UNIT IV

Boundary Layer Flow - Introduction, drag force on a flat plate due to boundary layer, turbulent boundary layer on a flat plate, analysis of turbulent boundary layer, separation of boundary layer.

Basics of Turbo Machinery - Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT V

Hydraulic Turbines - Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design, draft tube theory-functions and efficiency, unit and specific quantities, characteristic curves.

Hydraulic Pumps - Classification and working principle of centrifugal and reciprocating pumps.

4. Books and Materials

Text Book(s)

R K Bansal, *A Text Book of Fluid Mechanics and Hydraulic Machines*, Laxmi Publications, 9th edition, 2015.

Reference Book(s)

1. P. N. Modi and S.M. Seth, *Hydraulics and Fluid mechanics including Hydraulics Machines*, Rajsons Publications Pvt.Ltd, 20th Edition, 2013.
2. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*, Kotaria& Sons, 9th Edition, 2013.
3. Rajput, *Fluid Mechanics and Hydraulic Machines*, S.Chand& Co, 6th Edition, 1998.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1326 – FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

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

1. Course Description

Course Overview

This course imparts intensive and extensive practical knowledge on the concepts of Fluid Mechanics and Hydraulic Machines in the field of mechanical engineering. This course provides the knowledge in measuring the pressure and discharge using different machines at various conditions. It also provides the performance analysis of various hydraulic machines. The student should be able to develop practical capabilities, so that they can apply the knowledge gained in this course to solve complex engineering problems.

Course Pre/corequisites

A1308 - Engineering Mechanics
A1325 - Fluid mechanics and hydraulic machines

2. Course Outcomes (COs)

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

A1326.1	Analyze procedure for performance of various experiments.
A1326.2	Calibrate flow discharge measuring devices used in pipes, channels and tanks.
A1326.3	Analyze the fluid flow through pipes with different materials and sizes.
A1326.4	Determine coefficient of discharge of fluid flow through pipes.
A1326.5	Evaluate the performance analysis of various pumps and turbines.

3. Course Syllabus

1. Verification of Bernoulli's Equation
2. Calibration of Mouthpiece/orifice
3. Calibration of Triangular/Rectangular Notch
4. Calibration of Venturi meter
5. Calibration of Orifice meter
6. Determination of Friction Factor for a given pipe line
7. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
8. Calculate the Forces and efficiency of Impact of Jet on Vanes
9. Performance Test on Pelton Wheel
10. Performance Test on Single Stage Centrifugal Pump
11. Performance Test on Multi Stage Centrifugal Pump

12. Performance Test on Reciprocating Pump

4. Laboratory Equipment/Software/Tools Required

1. Flat vane and Hemi spherical vane
2. Notches
3. Orifices and Mouthpieces
4. Experimental setup for major and minor losses
5. Venturimeters and orifice meters
6. Bernoulli's Apparatus
7. Pelton Turbine
8. Single, Multi Stage centrifugal and Reciprocating Pumps

5. Books and Materials

Text Book(s)

R K Bansal, *A Text Book of Fluid Mechanics and Hydraulic Machines*, LaxmiPublications, 9th edition, 2015.

Reference Book(s)

1. P.N.Modi and S.M. Seth, *Hydraulics and Fluid mechanics including Hydraulics Machines*, Rajsons Publications Pvt.Ltd, 20th edition, 2013.
2. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*, Kotaria& Sons, 9th edition 2013.
3. Rajput, *Fluid Mechanics and Hydraulic Machines*, S. Chand & Co, 6th edition, 1998.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1327– MACHINE TOOLS 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 hands on learning experience working with machines like Lathe, Drilling, Milling, Shaping, and etc. This course provides the constructional features and operational principle of these machines. Using these conventional machines, the learner will be able to remove unwanted materials from the metal and improve the surface through finishing process to get the final product.

Course Pre/corequisites

A1351 - Machining Processes

2. Course Outcomes (COs)

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

A1327.1 Identify various machine tools used in machine shop

A1327.2 Distinguish the constructional features and operations of general purpose machines

A1327.3 Determine the sequence of operations to process a job

A1327.4 Make use of various machining operations to perform metal cutting

A1327.5 Prepare models using required machine tools

3. Course Syllabus

1. Demonstrate the construction and operation of general purpose machines:
    a. Lathe machine
    b. Drilling machine
    c. Milling machine
    d. Shaper machine
    e. Slotting machine
    f. Cylindrical grinder
    g. Surface grinder, tool and cutter grinder
2. To perform step turning and taper turning operations on lathe machine.
3. To perform thread cutting and knurling operations on lathe machine.
4. To drill a hole and perform tapping operation using drilling machine.
5. To perform shaping operation on shaping machine.
6. To perform slotting operation on slotting machine.
7. To perform milling operations (groove cutting/ gear cutting) on universal milling machine.
8. To perform grinding operations using cylindricaland surface grinding machine.
9. To perform grinding operation using grinding tool angle machine.

4. Laboratory Equipment/Software/Tools Required

1. Lathe Machine
2. Drilling Machine
3. Milling Machine
4. Shaper Machine
5. Slotting Machine
6. Cylindrical Grinder
7. Surface and tool grinder
8. Cutter grinder

5. Books and Materials

Text Book(s)

R.K. Jain and S.C. Gupta, *Production Technology*, Khanna Publishers, 17th edition, 2012.

Reference Book(s)

1. B.S.RaghuVamshi, *Workshop Technology*, Vol II, Dhanpat Rai & Co, 10th edition, 2013.
2. K.L.Narayana, *Production Technology*, IK International Publishers, 2nd Revised edition, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1328– PRODUCTION DRAWING PRACTICE

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 deals with the convenient way of creating a design of various components used in various engineering disciplines. It provides the detailed specifications of materials, limits, fits, tolerances and surface roughness. This course also provides good knowledge in production systems and their applications related to engineering problems.

Course Pre/corequisites

A1317 - Machine Drawing

2. Course Outcomes (COs)

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

A1328.1 Construct the conventional representation of different materials used in engineering practice.

A1328.2 Identify the machine elements and designation of material.

A1328.3 Apply the drawing techniques to draw various parts of assembly drawing, tolerances, roughness.

A1328.4 Improve visualization ability of surface roughness and its indications with respect to the material surface

A1328.5 Plan the production drawings based on design constraints.

3. Course Syllabus

UNIT I

Conventional Representation of Materials -Conventional representation of parts, screw joints, welded joints, springs, and gears, electrical, hydraulic and pneumatic circuits, methods of indicating notes on drawings.

UNIT II

Limits, Fits and Tolerances - Types of fits, exercises involving selection/interpretation of fits and estimation of limits from tables.

UNIT III

Detailed and Part Drawings -Drawing of parts from assembly drawings with indications of size, tolerances, roughness, and tolerances.

4. Books and Materials

Text Book(s)

K.L.Narayana & P. Kannaiah, *Production and drawing*, New Age International, 2009

Reference Book(s)

R.K.Jain , *Machine Drawing*, Khanna Publications, New Delhi, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1015 – PROFESSIONAL VALUES & 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 corequisites

2. Course Outcomes (COs)

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

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

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

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

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

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

3. Course Syllabus

UNIT I

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

UNIT II

channels of youth moments for national building - NSS and 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.

Fundamental rights and fundamental duties - Human rights, consumer awareness, 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 afforestation), health, hygiene and sanitation, health education, food and nutrition, safe drinking water, sanitation, swachh 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.,

Gender sensitization - Understanding gender, gender inequality, challenges, domestic violence, initiatives of government, schemes, law, initiates of NGOs, awareness, movement.

UNIT V

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

4. Books and Materials

Text Book(s):

1. Mike Martin and Roland Scherzinger, *Ethics in Engineering,* New York, McGraw Hill, 1996.

2. A.S. Chauhan, *Society and Environment,* Jain Brothers Publications, 6th Edition, 2006

Reference Book(s)

1. Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Engineering Ethics*, Prentice Hall of India, 2004

2. Charles D Fleddermann, *Engineering Ethics*, New Jersey Prentice Hall, 2004 (Indian Reprint).

3. John R Boatright*, Ethics and the Conduct of Business*, New Delhi, Pearson Education, 2003

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

VI – SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

VI SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1329	Operations Research	PC	3	0	0	3	30	70	100
A1330	Design of Transmission Systems	PC	3	1	0	4	30	70	100
A1331	Metal Forming Processes	PC	3	0	0	3	30	70	100
A1332	Heat Transfer	PC	3	0	0	3	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
A1333	Heat Transfer Laboratory	PC	0	0	3	1.5	30	70	100
A1334	CAD/CAM Laboratory	PC	0	0	3	1.5	30	70	100
A1335	Comprehensive Online Examination – II	PC	0	0	0	1	-	100	100
A1016	Advanced English Language Communication Skills	MC	2	0	0	0	100*	0	100*
	TOTAL		20	01	06	23	240	660	900

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1329 – OPERATIONS RESEARCH

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

Operations Research is a science of modelling and optimization of available resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1329.1 Apply various Operations Research models and methods to solve real world problems.

A1329.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A1329.3 Evaluate various alternatives available to find optimal solution for real world problems.

A1329.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A1329.5 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 Models- 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*, 9 th 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
A1330 – DESIGN OF TRANSMISSION SYSTEMS

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 focuses on designing various machine components by undergoing related theory like design process, stress, strain and theories of failures. This knowledge enables the students to design various mechanical components like curved beams, drives, bearings, gears, springs and IC engine parts under different loading conditions.

Course Pre/co requisites

A1308 - Engineering Mechanics
A1313 - Mechanics of Solids
A1317 - Machine Drawing
A1324 - Design of Machine Elements

2. Course Outcomes (COs)

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

A1330.1 Assess the type of stresses induced in crane hooks, C-clamps and drives subjected to various loadings.

A1330.2 Design different types of bearings for suitable applications.

A1330.3 Design springs and power screws under different load conditions as per the practical situation.

A1330.4 Solve the problems related to spur and helical gears for power transmission.

A1330.5 Analyze the stresses induced in IC engine parts subjected to various loads.

3. Course Syllabus

UNIT I

Design of curved beams - Stresses in curved beams, Expression for radius of neutral axis for rectangular, circular, trapezoidal and T-Section. Design of crane hooks, C –clamps.

Design of power transmissions systems- Design of flat belt drives, v-belt drives & rope drives, selection of wire ropes, design procedure for chain drives

UNIT II

Design of bearings - Types of journal bearings, lubrication, bearing materials, journal bearing design, ball and roller bearings, static loading of ball & roller bearings, bearing life, failure of bearings.

UNIT III

Design of mechanical springs - Stress and deflections of helical springs, springs for fatigue loading, natural frequency of helical springs, energy storage capacity, helical torsion springs, concentric springs, design of leaf springs

UNIT IV

Design of power screws - Types, efficiency of the screw, design of compound screw, differential screw, possible failures

Design of spur & helical gears - Spur gears, helical gears, bending strength, design analysis of spur and helical gears, estimation of centre distance, module, face width, check for dynamic and wear considerations.

UNIT V

Design of IC engine parts - Pistons; design of piston, cylinder, connecting rod, crank shafts, centre and over hung cranks.

4. Books and Materials

Text Book(s)

Bhandari, V B., *Design of Machine Elements*, 3rd edition, New Delhi, Tata McGraw Hill Book Company, 2009.

Reference Book(s)

1. R.S. Kurmi, J.K. Gupta, *Machine Design*, New Delhi, S. Chand Publishers, 2005
2. Joseph E.Shigely, *Mechanical Engineering Design*, New Delhi, TMH Publishers, 9th edition, 2011
3. S. Md. Jalaludeen, *Design Data Hand Book*, First edition, Anuradha Publications, 2009

   [Prescribed Data Book]

NOTE: Prescribed Data Book is permitted to carry for examinations.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1331 – METAL FORMING PROCESSES

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

1. Course Description

Course Overview

This course deals with the processes to obtain finished product without actual removal of metal from the workpiece. It provides details about forming processes like rolling, forging, extrusion, wire drawing, sheet metal working, processing of plastics and rapid manufacturing process. With the knowledge acquired through this course, the learner will be able to manufacture the products by reducing the wastage of material.

Course Pre/corequisites

A1201 – Material Science and Engineering

2. Course Outcomes (COs)

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

A1331.1	Apply hot working and cold working processes to workpiece for obtaining a final product
A1331.2	Apply the mechanism of deformation for different metals.
A1331.3	Analyze the effect of process parameters influencing metal forming.
A1331.4	Identify the metal forming process used for given application.
A1331.5	Examine effects of friction, lubrication and causes of common defects in metal forming

3. Course Syllabus

UNIT I

Hot and Cold working – Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, comparison of properties of cold and hot worked parts.

UNIT II

Rolling – Bulk deformation processes, economics of bulk forming, principles and theory of rolling, types of rolling mills and products, forces in rolling and power requirements, applications and limitations, defects in rolled products.

Forging Processes – Principles of forging, types of forging, forging defects, forces in forging of strip and applications

UNIT III

Extrusion Processes – Mechanics of hot and cold extrusion, forward extrusion and backward extrusion, forces in extrusion of cylindrical and non cylindrical components, characteristics and defects in extruded parts.

Wire Drawing – Process mechanics and its characteristics, determination of degree of drawing, drawing force and defects in products.

UNIT IV

Sheet Metal Working – Cold working processes, blanking and piercing, bending and forming, drawing and its types, hot and cold spinning operations, and defects in sheet metal products.

UNIT V

Processing of Plastics – Injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding.

Rapid Manufacturing – Concepts of rapid manufacturing, classification of rapid prototyping processes, Applications of rapid prototyping process.

4. Books and Materials

Text Book(s):

Schmid and Kalpakjin, *Manufacturing Technology*, Pearson Education, 7th edition, 2014.

Reference Book(s):

1. P. N. Rao, *Manufacturing Technology*, *Foundry forming and welding*, Volume I, McGrawHill education, fifth edition, 2018.
2. K.L. Narayana, *Production Technology*, I.K. International Pub, 3rd edition, 2013.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 18th edition, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1332 – HEAT TRANSFER

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 introduction to the principal concepts and methods of heat transfer. The objectives of this course are to develop the fundamental principles and laws of heat transfer and to explore the implications of these principles for system behavior; to formulate the models necessary to study, analyze and design heat transfer systems through the application of these principles; to develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications.

Course Pre/corequisites

A1307- Thermodynamics

2. Course Outcomes (COs)

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

A1332.1 Apply laws of heat transfer in thermal analyses of engineering systems.

A1332.2 Calculate the amount of heat transfer in conduction, convection and radiation modes.

A1332.3 Discuss the concept of conduction heat transfer and its applications.

A1332.4 Analyze the free and forced convective heat transfer for fluids.

A1332.5 Analyze the concept of radiative heat transfer between black bodies and grey bodies.

3. Course Syllabus

UNIT I

Conduction Heat Transfer- Fourier rate equation, general heat conduction equation in cartesian, cylindrical and spherical coordinates, simplification and forms of the field equations.

UNIT II

One Dimensional Steady State Heat Conduction- In homogeneous slabs, hollow cylinders and spheres, overall heat transfer coefficient , electrical analogy, critical radius/thickness of insulation, with variable thermal conductivity, internal heat generation and negligible internal resistance.

Heat Transfer in Extended Surface (Fins)- Efficiency, effectiveness and temperature distribution on long fin, fin with insulated tip and short fin, application to errors in temperature measurement.

UNIT III

Convective Heat Transfer- Dimensional analysis, Buckingham π theorem and its application for developing semi , empirical non-dimensional correlations for convective heat transfer , significance of non-dimensional numbers, concepts of continuity, momentum and energy equations, concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat **transfer for flow over** – flat plates, cylinders and spheres in external flows and internal flows for forced convection and free convection.

UNIT IV

Heat Transfer with Phase Change- Boiling**-** Pool boiling, regimes, determination of heat transfer coefficient in nucleate boiling, critical heat flux and film boiling.

Condensation- Film wise and drop wise condensation, nusselt's theory of condensation on a vertical plate, film condensation on vertical and horizontal cylinders using empirical correlations.

UNIT V

Heat Exchangers- Classification of heat exchangers, overall heat transfer coefficient and fouling factor, concepts of LMTD and NTU methods, problems using LMTD and NTU methods.

Radiative Heat Transfer- Laws of radiation, heat exchange between black bodies and grey bodies, radiation shields.

4. Books and Materials

Text Book(s)

R.C. Sachdeva, *Fundamentals of Engineering Heat and Mass Transfer*, New Age International, 4th edition, New Delhi, 2010.

Reference Book(s)

1. C P Kothandaraman, S Subramanyan, *Heat and Mass Transfer Data Book* , New Age International (P) Ltd Publishers, 9th edition, 2018

   [Prescribed Data Book]

2. P.K.Nag, *Heat Transfer*, 3rd edition, Tata McGraw Hall, New Delhi, 2011

3. Holman.J.P, *Heat Transfer*, 10th edition, Tata McGraw Hall, New Delhi, 2012

NOTE: Prescribed Data Book is permitted to carry for examinations.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1333 – HEAT TRANSFER 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 with fundamental and industrial knowledge about modes of heat transfer, like conduction, convection and radiation, and their applications. The laboratory experiments deals with calculation of thermal conductivity and heat transfer coefficients in various materials like brass, copper, bronze etc. Students will gain practical knowledge through lab experiments by making use of various types of equipments such as pin fin, lagged pipe, emissivity apparatus, Stefan's Boltzmann apparatus, heat exchanger apparatus etc.

Course Pre/corequisites

A1332- Heat Transfer

2. Course Outcomes (COs)

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

A1333.1 Analyze thermal conductivity in various materials.

A1333.2 Calculate heat transfer coefficient in various materials.

A1333.3 Select appropriate materials for improving effectiveness of heat transfer.

A1333.4 Test the performance and there by improve effectiveness of heat exchanger.

A1333.5 Calculate emissivity and Stefan's Boltzmann constant for various bodies through radiation.

3. Course Syllabus

1. To determine thermal conductivity of insulating powder material through concentric sphere apparatus.
2. To determine the thermal conductivity of a metal rod along its length.
3. To determine overall heat transfer co-efficient of composite slab
4. To determine heat transfer coefficient for natural convection through pipe
5. To determine the heat transfer coefficient for forced convection through pipe.
6. To determine heat transfer in pin-fin.
7. To determine the effectiveness and overall heat transfer coefficient of double pipe heat exchanger with Parallel and counter flow arrangement.
8. To determine Emissivity of a grey body through emissivity apparatus.
9. To determine Stefan Boltzmann constant.
10. To determine the critical Heat flux at different temperatures of water.
11. To visualize the process of nucleate and film boiling on the heating element.

4. Laboratory Equipment/Software/Tools Required

1. Concentric Sphere apparatus.
2. Metal Rod apparatus
3. Composite Slab apparatus
4. Natural convection apparatus
5. Forced convection apparatus
6. Pin-fin apparatus
7. Parallel and counter flow heat exchanger.
8. Emissivity apparatus.
9. Stefan's Boltzmann apparatus.
10. Critical Heat flux apparatus.
11. Drop and film wise condensation apparatus.

5. Books and Materials

Text Book

R.C. Sachdeva, *Fundamentals of Engineering. Heat and Mass Transfer*, New Age International, 4th edition, New Delhi, 2010.

Reference Book

C P Kothandaraman, S Subramanyan, *Heat and Mass Transfer Data Book* , New Age International (P) Ltd Publishers, 9th edition, 2018 .[Prescribed Data Book]

NOTE: Prescribed Data Book is permitted to carry for examinations.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1334– CAD / CAM 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 helps to design various mechanical components using 2D and 3D Software. In addition, this course provides knowledge about generating NC program with different CAM software packages and simulate the program for validation.

Course Pre/corequisites

A1311 - Computer Aided Drafting Laboratory

2. Course Outcomes (COs)

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

A1334.1 Construct complex geometries of machine components in sketcher mode.

A1334.2 Create programs to generate analytical and synthetic curves used in engineering practice.

A1334.3 Plan 2D and 3D drawings based on design constraints

A1334.4 Applying CAD/CAM concept to product design and manufacturing.

A1334.5 Analyze G and M codes for turning and milling components.

3. Course Syllabus

1. 2D Drafting using Auto CAD or any drafting package
2. Modelling of component in 3D – V block
3. Modelling of component in 3D – Open Bearing
4. Modelling of component in 3D – Angular block
5. Modelling of component in 3D – Dovetail Guide
6. Assembly of a screw jack parts
7. Assembly of a knuckle joint
8. Assembly of an Oldham's coupling
9. Assembly of a footstep bearing
10. Machining of simple components on CNC Lathe and CNC Milling Machine

4. Laboratory Equipment/Software/Tools Required

1. Computer systems installed with operating system
2. AutoCAD software
3. CNC Lathe Machine
4. CNC Milling Machine

5. Books and Materials

Text Book(s)

M. N. Sesha Prakash, C.S.Suresh , *Computer Aided Design Lab Manual,* 1st edition*, 2006.*

Reference Book(s)

Chang, T. C., Wysk, R. A., Wang, H. P, *Computer aided Manufacturing*, Prentice Hall, 2nd edition, 1998.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1016-ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS

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

1. Course Description

Course Overview

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

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

A1016.1 Recall vocabulary and enhance accuracy in grammar.

A1016.2 Understand and communicate effectively in speaking and in writing.

A1016.3 Apply language structures to construct good relations.

A1016.4 Identify and develop effective technical writing skills.

A1016.5 Determine and develop personal presentation techniques.

A1016.6 Design necessary skills to deliver presentation confidently for improving in respective domains.

3. Course Syllabus

UNIT I: COMMUNICATION SKILLS:

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

UNIT II: WRITING SKILLS:

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

UNIT III: PRESENTATION SKILLS:

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

UNIT IV: GETTING READY FOR JOB:

1 Debates 2 Group discussions 3 Job Interviews

UNIT V: INTERPERSONAL SKILLS:

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

4. Books and Materials

Text Books:

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

Reference Books:

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

Software

Indigenous and orell software.

COURSE STRUCTURE

VII – SEMESTER

VII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A1336	Production and Operations Management	PC	3	0	0	3	30	70	100
A1337	Finite Element Method	PC	3	0	0	3	30	70	100
A1338	Instrumentation and Control Systems	PC	3	0	0	3	30	70	100
A1341	Additive Manufacturing	PC	2	0	0	2	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
A1339	Instrumentation and Control Systems Laboratory	PC	0	0	3	1.5	30	70	100
A1340	Computer Aided Engineering Laboratory	PC	0	0	3	1.5	30	70	100
A1342	Mini-Project/Internship	PW	0	0	4	2	100	0	100
A1343	Project Work Phase-I	PW	0	0	4	2	100	0	100
	TOTAL		15	01	16	24	440	560	1000

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COURSE STRUCTURE

A1336 – PRODUCTION AND OPERATIONS MANAGEMENT

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 covers a variety of state-of-the-art topics and technologies including Forecasting Techniques, quality control, facilities planning and design, production and inventory control. This course helps students in better understanding of real world industrial procedures and processes.

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:

A1336.1: Apply the knowledge in management tools to apply in technical organizations.

A1336.2: Apply forecasting techniques to predict future demand and other parameters.

A1336.3: Make use of plant layout design to facilitate material flow and processing of a product in the most efficient manner through the shortest possible time.

A1336.4: Apply quality improvement techniques and methods for improvement of quality of product and process

A1336.5: Determine the inventory and to be able to apply selected techniques for its control and management under different circumstances

3. Course Syllabus

UNIT-I

Functions of Production Planning & Control, productivity, productivity measurement, generating new products, product development, aggregates planning, aggregate planning strategies

UNIT-II

Forecasting – Importance of forecasting – Types of forecasting, their uses – General Principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods – accuracy of forecasting methods. Scheduling Policies – Techniques

UNIT-III

Factors affecting facilities location, mathematical models for facilities location. Types of facilities layout: product layout, process layout, group technology layout, Assembly line balancing.

UNIT-IV

Lean Management, philosophy and creation of lean enterprise, JIT concepts-Kanban System-Elements of total quality management, Six Sigma Quality Control, MRP, lot sizing techniques in MRP, objectives of ISO 9000 series, Benefits of ISO 9000 series, Steps in ISO 9000 registrations

UNIT - V

Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – various models, Simple Problems

4. Books and Materials

Text Book(s)

Ajay K Garg *"Production and Operations Management",* McGrawHill, 2015.

Reference Book(s)

1. S.N. Chary, "*Operations Management"* McGrawHill, 6th Edition,2019
2. *P*anneerselvam , *"Production and Operations management"*, PHI, 3 rd Edition, 2012.

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COURSE STRUCTURE

A1337 – FINITE ELEMENT METHOD

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 applications of Mechanics of Solids, Heat transfer problems with required Boundary conditions by using Numerical Methods. By this course, student will learn the principles involved in discretization in finite element approach, form stiffness matrices and force vectors for simple elements

Course Pre/corequisites

1. **A1003-**AppliedPhysics
2. **A1303**-Applied Mechanics

2. Course Outcomes (COs)

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

A1337.1	Understand the concepts behind formulation methods in FEM.
A1337.2	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
A1337.3	Develop element characteristic equation and generation of global equation.
A1337.4	Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems
A1337.5	Able to apply suitable boundary conditions to a global equation for solve them displacements, stress and strains induced

3. Course Syllabus

Unit-I

INTRODUCTION: Equilibrium equations in elasticity subjected to body force, traction forces and point loads, stress strain relations in 3D elasticity, plane stress and plane strain, Boundary conditions, Initial conditions.. Approximate methods for solving the differential equations: Rayleigh-Ritz method, Weighted residual methods, Galerkin's method. Integral formulation: Principle of a minimum potential energy, principle of virtual work, Generalized

Finite element approach in solving these problems. Solution methods for solving simultaneous equations

UNIT II

Problems with One-dimensional geometry:
Bars: Formulation of stiffness matrix, Load vectors, Incorporation of boundary conditions: Elimination approach and penalty approach
Trusses: Plane truss and space truss elements, Example problems involving plane All truss elements. Examples involving multipoint constrains. Stress calculations.
Beams : Bending of beams, Interpolation functions, formulation of stiffness matrix and load vectors.. Transformations of stiffness and load vectors

UNIT III

INTERPOLATION MODELS: Polynomial form of interpolation functions - linear, quadratic and cubic, simplex, complex, Multiplex elements, Selection of the order of the interpolation polynomial, Convergence requirements, 2D Pascal Triangle, Linear interpolation polynomials in terms of global coordinates for triangular (2D simplex) elements, Linear interpolation polynomials in terms of local coordinates for triangular (2D simplex) elements, quadrilateral element.
HIGHER ORDER AND ISOPARAMETRIC ELEMENTS: Lagrangian interpolation, Higher order one dimensional elements- quadratic, Cubic element and their shape functions, properties of shape functions, Shape functions of 2D quadratic triangular element in natural coordinates, 2D quadrilateral element shape functions – linear, quadratic

UNIT IV

FINITE ELEMENT APPLICATION IN SOLID MECHANICS: Problem modelling and finite element analysis in 2D plane elasticity with triangular and quadrilateral elements, Isoparametric, sub parametric and super parametric elements. Interpolation, Jacobian, matrices relating strain and nodal displacements, stiffness matrix formulation, Consistent and lumped load vectors, Numerical integration Gaussian quadrate.
Axi-symmetric triangular elements: formulation of stiffness and load vectors.

UNIT V

HEAT TRANSFER PROBLEMS: Steady state heat conduction with convective and heat flux boundary conditions, Functional approach, Galerkin approach formulation of element characteristic matrices and vectors in 1D and 2D problems. Temperature distribution in composite walls one dimensional and two dimensional fins and extended surfaces

4. Books and Materials

Text Book(s)

Rao, S. S., *Finite element method in engineering*, 5th Edition, Pergaman Int. Library of Science, 2010.

Chandrupatla T. R., *Finite Elements in engineering*, 2nd Edition, PHI, 2013

Reference Book(s)

1.. J.N.Reddy, "*Finite Element Method*"- McGraw -Hill International Edition.Bathe K. J. Finite Elements Procedures, PHI.

2. Cook R. D., et al. "*Conceptsand Application of Finite Elements Analysis*"- 4th Edition, Wiley & Sons, 2003.

COURSE STRUCTURE

A1338 – INSTRUMENTATION AND CONTROL SYSTEMS

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	3	30	70	100

2. Course Description

Course Overview

Fundamental knowledge of measuring principles, configuration and functional description of instruments with static, dynamic inputs and error control. The concepts and working of instrumentation devices for displacement, flow, dynamic and other mechanical measurement applications. Instrumentation practices and automatic control system for monitoring industrial real time processes within limits of parameter specifications

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:

A1338.1: Recognize the importance of basic principles, configuration and functional description of measuring instruments.

A1338.2: Describe performance characteristics of an instrument when the device is exposed to measure dynamic inputs and error control.

A1338.3: Categorize the measuring instruments based on the principle of working with the physical parameters such as displacement, temperature and pressure.

A1338.4: Explain calibration of instruments for measurement of all types of mechanical parameters.

A1338.5: Demonstrate working principle of level measuring devices for ascertaining liquid level and choose appropriate device for controlling fluid level in industrial applications.

A1338.6: Make use of appropriate instrument for measuring Speed, Acceleration and Vibration by considering different aspects.

3. Course Syllabus

UNIT-I

Definition: Basic principles of measurement, Measurement systems, generalized configuration and functional descriptions of measuring instruments. examples - Dynamic performance characteristics , sources of error, Classification and elimination of error.

UNIT-II

Measurement of Displacement: Introduction, Theory and construction of various transducers to measure displacement Piezo electric, Inductive, capacitance transducers, Resistance, ionization and Photo electric transducers, Calibration procedures.

Measurement of Temperature:

Classification, Ranges, Various Principles of measurement. Expansion, Electrical Resistance, Thermistor, Thermocouple, Pyrometers, Temperature Indicators

UNIT-III

Measurement of Pressure: classification, different principles used. Manometers, Piston, Bourdon pressure gauges, Bellows, Diaphragm gauges. Low pressure measurement — Thermal conductivity gauges — ionization pressure gauges, McLeod pressure gauge.

Flow Measurement: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hotwire anemometer, Laser Doppler Anemometer (LDA).

UNIT-IV

Control systems and Mathematical models: Introduction, examples of control systems, classification of control systems , open loop and closed loop control systems ,control system terminology, servo mechanism, physical system and mathematical models.

UNIT - V

Performance of control systems: Standard test inputs, response of first order control systems, performance of second order control systems, properties of transient response, steady state error and error constants. Concept of stability.

4. Books and Materials

Text Book(s)

1. K Padma Raju, Y J Reddy, “Instrumentation and Control Systems”, McGraw Hill Education1st Edition, 2016.
2. S W. Bolton, “Instrumentation and Control Systems”, Newness Publisher, 1st Edition, 2004.
3. K Singh, “Industrial Instrumentation and Control”, McGraw Hill Education, 3rd Edition, 2015.

Reference Book(s)

1. Schmidt, L.V., “Introduction to Aircraft Flight Dynamics”, AIAA Education Series, 1st Edition, 1998,
2. McCormick, B.W., “Aerodynamics, Aeronautics, and Flight Mechanics”, Wiley India, 2 nd Edition, 1995.

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COURSE STRUCTURE

A1341 – ADDITIVE MANUFACTURING

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

1.Course Description

Course Overview

Additive Manufacturing (AM) is a process of joining materials to make objects from 3D model data, usual y layer up on layer, as opposed to subtractive manufacturing methodologies, such as traditional machining. The basic principle of AM is that a model, initially generated using a three-dimensional Computer Aided Design (3D CAD) system, can be fabricated directly. AM technologies have significantly evolved over the last decade. Because of their potential to extensively transform the nature of manufacturing processes, e.g., by enabling "Freedom of Design" several industries have been attracted by these technologies. Using AM, manufacturing of highly complex parts can be an economically viable alternative to convention al manufacturing technologies.

Course Pre/corequisites

A1366 – Digital Manufacturing

2. Course Outcomes (COs)

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

A1341.1 History and Development of Additive manufacturing, Applications, and RP data formats.

A1341.2 Basic Concept Reverse Engineering and Software's for Additive Manufacturing.

A1341.3 Principle, Process, Materials, Advantages of Solid and Liquid Based AM Systems.

A1341.4 Principle and Process of Selective Laser Sintering of Powder Based AM Systems

A1341.5 Principle, Process, Advantages, Limitations, Applications of BPM, SDM, AM systems

3. Course Syllabus

UNIT-I

Introduction to Additive Manufacturing (AM) Systems: History and Development of AM , Need of AM ,Difference between AM and CNC, Classification of AM Processes: Based on

Layering Techniques, Raw Materials and Energy Sources, AM Process Chain, Benefits and Applications of AM, Representation of 3D model in STL format, RP data formats: SLC, CLI, RPI, LEAF, IGES, CT, STEP, HP/GL.

UNIT-II

CAD & Reverse Engineering: Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: Software's for Additive Manufacturing Technology: MIMICS, MAGICS. **Reverse Engineering (RE)** – Meaning, Use, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.

UNIT-III

Solid and Liquid Based AM Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications. Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

UNIT-IV

Powder Based AM Systems : Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineering Net Shaping Advantages ,Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

UNIT –V

Other Additive Manufacturing Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitationsand Applications. **Ballistic Particle Manufacturing (BPM):** Principle, Process, Advantages, Limitations, Applications. **Shape Deposition Manufacturing (SDM):** Principle, Process, Advantages, Limitations, Applications.

4. Books and Materials

Text Book(s)

1. "Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing" by Ian Gibson and David Rosen.

Reference Book(s)

1. "Additive Manufacturing Technologies" by Ian Gibson and David Rosen.

2. “Additive Manufacturing of Metals: From Fundamental Technology to Rocket Nozzles, Medical Implants, and Custom Jewelry (Springer Series in Materials Science)” by John O Milewski.

3. Design for Additive Manufacturing” by Dr Tom Page.

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COURSE STRUCTURE

A1339 – INSTRUMENTATION AND CONTROL SYSTEMS LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	2	30	70	100

1. Course Description

Course Overview

This course provides fundamental knowledge of measuring principles, configuration and functional description of instruments with static, dynamic inputs and error control. The concepts and working of instrumentation devices for displacement, flow, dynamic and other mechanical measurement applications. Instrumentation practices and automatic control system for monitoring industrial real time processes within limits of parameter specifications

Course Pre/corequisites

2. Course Outcomes (COs)

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

A1339.1 Understand basic principles of instrumentation and control systems

A1339.2 Apply calibration of measuring instruments for linear and angular displacement. A1339.3: Understand calibration of measuring instruments for temperature.

A1339.4 Apply calibration of measuring instruments of flow and speed measurement

A1339.5 Demonstrate working principle of level measuring devices for ascertaining liquid level and choose appropriate device for controlling fluid level in industrial applications.

A1339.6 Make use of appropriate instrument for measuring Speed, Acceleration and Vibration by considering different aspects.

3. Course Syllabus

1. Calibration of Pressure Gauges
2. Calibration of transducer or thermocouple for temperature measurement
3. Study and calibration of LVDT transducer for displacement measurement.
4. Study and calibration of capacitive transducer for angular measurement.
5. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
6. Study and calibration of a rotometer for flow measurement.

7. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads
8. Study and calibration of Mcleod gauge for low pressure

4. Books and Materials

Text Book(s)

1. D.S.Kumar,—*Measurement Systems: Applications & Design*, Anuradha Agencies,1st Edition, 2013
2. K Padma Raju, Y J Reddy, *"Instrumentation and Control Systems"*, McGraw Hill Education 1st Edition, 2016.

Reference Book(s)

1. C.Nakra,K.K.Choudhary,—*Instrumentation, Measurement & Analysis*, Tata McGraw Hill, 1st Edition, 2013.
2. Schmidt, L.V., "*Introduction to Aircraft Flight Dynamics*", AIAA Education Series, 1st Edition, 1998,

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COURSE STRUCTURE

A1340 – COMPUTER AIDED ENGINEERING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	2	30	70	100

2. Course Description

Course Overview

This course provide fundamental knowledge of measuring principles, configuration and functional description of instruments with static, dynamic inputs and error control. The concepts and working of instrumentation devices for displacement, flow, dynamic and other mechanical measurement applications. Instrumentation practices and automatic control system for monitoring industrial real time processes within limits of parameter specifications

Course Pre/corequisites

A1301 - Engineering Graphics and Computer Aided Drafting

A1308 - Engineering Drawing for Mechanical Engineers

2. Course Outcomes (COs)

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

A1340.1 Apply mathematical skills in the design and analysis of model generations and analysis.

A1340.2 Exercise analytical skills in model verifications and interpretations of FEA results.

A1340.3 Apply knowledge from component design in projects

A1340.4 Detailing a conceptual design involves determining material specifications, Dimensions, tolerances, performance measures, etc

A1340.5 Understand the basic concepts of modelling for analysis and manufacturability.

3. Course Syllabus

I. Introduction to Analysis Software Package

II. Structural analysis: (Any Six exercises)

1. Analysis of a rectangular plate with a hole.
2. Analysis of a truss member under loading.
3. Analysis of a bracket plate with axial loading

4. Analysis of a bracket plate with eccentric loading

5. Static Analysis of Prismatic bar

6. Static Analysis of a Corner Bracket

7. Static Analysis of beam

8. Analysis of Thermally Loaded support Structure

9. Analysis of Hinged support member

10. Analysis of Tapered plate under transverse load

III. Thermal analysis: (Any two exercises)

1. Analysis of a square plate considering conduction.

2. Analysis of a square plate considering conduction and convection.

3. Analysis of a compound bodies considering conduction and convection.

4. Laboratory Equipment/Software/Tools Required

1. ANSYS
2. ALG Nastran
3. Star-CCM+
4. Fluent
5. FIRE. CFX

5. Books and Materials

Text Book(s)

1. ANSYS tutorials in the PDF format will be provided by the instructor.
2. Class handouts and notes will be the primary learning resources for the lecture-based topics

Reference Book(s)

R.B. Choudary, *Engineering graphics with AutoCAD*, Anuradha Publishers, 2015

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COURSE STRUCTURE

VIII – SEMESTER

VIII SEMESTER (IV YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	MOOC/ Professional Elective-5	PE	3	0	0	3	30	70	100
	Open Elective – 3	OE	3	0	0	3	30	70	100
A1344	Technical Seminar	PW	0	0	4	2	100	-	100
A1345	Project Work Phase-II	PW	0	0	16	8	60	140	200
	TOTAL		06	00	20	16	220	280	500

PROFESSIONAL ELECTIVES

PROGRAMME STRUCTURE UNDER R18 REGULATIONS

B. TECH – MECHANICAL ENGINEERING

Professional Electives

Professional Elective – 1	
Course Code	**Title of the Course**
A1351	Machining Processes
A1352	Non-Conventional Sources of Energy
A1353	Engineering Materials for Design
A1354	Principles of Management

Professional Elective – 2	
Course Code	**Title of the Course**
A1355	Flexible Manufacturing System
A1356	Refrigeration and Air Conditioning
A1357	Mechanical Vibrations
A1358	Energy Management

Professional Elective – 3	
Course Code	**Title of the Course**
A1359	Project Management
A1360	Automobile Engineering
A1361	Tribology
A1362	Precision Engineering

Professional Elective – 4	
Course Code	**Title of the Course**
A1363	Modern Manufacturing Methods
A1364	Gas Turbines and Jet Propulsion
A1365	Artificial Intelligence for Mechanical Engineers
A1366	Digital Manufacturing

Professional Elective – 5	
Course Code	**Title of the Course**
A1367	Industrial Engineering
A1368	Power Plant Engineering
A1369	Composite Materials
A1370	Automation and Robotics

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COURSE STRUCTURE
A1351– MACHINING PROCESSES

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 fundamental understanding of the basic concepts, terminology and geometry of tools required in the machining and finishing processes. This course covers constructional features, operation and specifications of various machines like lathe, milling, drilling, boring, broaching, and grinding machines. It also covers finishing operations such as lapping and honing. Student will apply this knowledge in manufacturing components.

Course Pre/corequisites

A1305 - Material Science and Engineering

A1316 - Manufacturing Technology

2. Course Outcomes (COs)

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

A1351.1 Identify the various machining processes and machine tools

A1351.2 Classify various metal cutting machines such as lathe, milling, drilling, boring, grinding, shaping, Slotting and planer machines.

A1351.3 Choose the suitable tools for machining processes.

A1351.4 Compare the constructional features of machines suitable for various machining operations.

A1351.5 Categorize the components of the machines.

3. Course Syllabus

UNIT I

Elementary Treatment of Metal Cutting Theory - Elements of cutting process, geometry of single point tool and angles, chip formation and types of chips, built up edge and its effects, chip breakers. Mechanics of orthogonal cutting, Merchant's Force diagram, cutting forces, cutting speed, feed, depth of cut, heat generation, tool life, coolants and machinability.

UNIT II

Engine Lathe - Principle of working, specifications of lathe, types of lathes, work holders and tool holders. Taper turning, thread turning and attachments for Lathes. Turret and capstan lathes, collet chucks, other work holders, tool holding devices, box and tool layout. Principal features of automatic lathes, classification, single spindle and multi spindle automatic lathes, tool layout and cam design.

UNIT III

Drilling and Boring Machines - Principle of working, specifications, types, operations performed, tool holding devices, twist drill, Boring tools, machining time calculation.

Shaping, Slotting and Planer machines - Principle of working, principal parts, specifications, classification, operations performed and machining time calculations.

UNIT IV

Milling Machines - Principle of working, specifications, classification of milling machines, principal features, machining operations, types and geometry of milling cutters, methods of indexing, accessories of milling machines.

UNIT V

Grinding Machines - Theory of grinding, classification, cylindrical and surface grinding machine, tool and cutter grinding machine, special types of grinding machines

Grinding wheel - Different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, honing and broaching machines, comparison of grinding, lapping and honing

4. Books and Materials

Text Book(s)

1. R.K. Jain and S.C. Gupta, *Production Technology*, Khanna Publishers, 17th edition, 2012.
2. B. S. Raghu Vamshi, *Workshop Technology*, Vol II, DhanpatRai & Co, 10th edition, 2013.

Reference Book(s)

1. Kalpakzian, *Manufacturing Technology,* Pearson, 6th edition 2010
2. Milton C.Shaw, *Metal cutting Principles*, oxford Second Edn, 2nd edition, 2012.
3. K. L. Narayana, *Production Technology*, IK International Publishers, 2nd revised edition, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1352 – NON-CONVENTIONAL SOURCES OF 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

This course provides the awareness to the students about basic concepts of various conventional and non-conventional sources of energy like fossil fuels, coal and solar energy, wind energy, bio-mass etc. It also covers the collection of various energy sources, their storage methods, conversion techniques and applications. The learner will be able to apply the knowledge gained from this course to solve real world energy problems during energy crisis.

Course Prerequisites

1. A1003 Engineering Physics
2. A1004 Engineering Chemistry
3. A1005 Environmental Studies

2. Course Outcomes (COs)

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

A1352.1 Identify various conventional and non-conventional sources of energy.

A1352.2 Estimate the energy collection using suitable equipment.

A1352.3 Compare different energy conversion systems within the available resources for better utilization.

A1352.4 Make use of the suitable energy storage methods for real-time requirements.

A1352.5 Analyze the advanced power generation systems like Magneto Hydro Dynamics and other methods for future requirements.

3. Course Syllabus

UNIT I

Principles of solar radiation- Role and potential of renewable energy sources, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation sun shine, solar radiation data.

UNIT II

Solar energy collection and storage- Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar energy storage- stratified storage, solar ponds, solar Applications, solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT III

Wind energy - Wind energy conversion, power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

Bio-mass - Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, and combustion characteristics of bio-gas, utilization for cooking,

UNIT IV

Tidal energy and wave energy - Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.

Wave energy - Conversion, properties of waves, power content, types of ocean thermal energy conversion systems.

UNIT V

Geothermal energy - Resources, methods of harnessing the energy, Potential in India.

Magneto Hydro Dynamics (MHD) - Principles of MHD Power generation, ideal MHD generator performance, practical MHD generator, MHD technology, Fuel cells.

4. Books and Materials

Text Book(s)

1 G.D. Rai, *Non-conventional sources*, Khanna Publishers, New Delhi, 2014.

2 John Twidell and Tony Weir, Renewable Energy Resources, CRC Press, 2015.

Reference Book(s)

1. B.H. Khan, Non-Conventional Energy Resources, McGraw-Hill, 2015.

2. S.P. Sukhatme and J.K. Nayak, Solar Energy, Tata McGrawHIll, 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1353 – ENGINEERING MATERIALS FOR DESIGN

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

1. Course Description

This course is important both from the perspective of material development and its properties and design of engineering components. Failure of structures by fatigue crack growth is another important topic which the student will learn in this course

Course Pre/corequisites

A1305 - Material Science and Engineering
A1324 - Design of Machine Members-I

2. Course Outcomes (COs)

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

A1353.1 Distinguish the brittle and ductile fracture of materials and its crack structures

A1353.2 Analyse the structural components taking into account presence of flaws, nature of loading and constitutive behaviour of the material.

A1353.3 Apply J-Integral for crack initiation and tip opening displacement in materials

A1353.4 Assess the dynamic stress intensity and elastic energy release rate induced in materials

A1353.5 Identify the various stages of crack propagation, load spectrum, crack growth initiation

3. Course Syllabus

UNIT I

Fracture - Introduction, Mechanisms of Fracture, A crack in structure, The Griffith's criterion, Modern design, Strengths, stiffness and toughness, Stress intensity approach.

UNIT II

Linear elastic fracture mechanics - Crack tip stress and deformations, Relation between stress intensity factor and fracture toughness, Stress intensity based solutions, crack tip plastic zone estimation, Plane stress and plane strain concepts. The Dugdale approach, the thickness effect.

UNIT III

Elasto - plastic – Introduction, Elasto – plastic factor criteria, Crack resistance curve, J-integral, Crack opening displacement, Crack tip opening displacement. Importance of R - curve in fracture mechanics, experimental determination of J-integral, COD and CTOD.

UNIT IV

Dynamic stress – The Dynamic Stress Intensity and elastic energy release rate, Crack branching, The Principles of crack arrest, The Dynamic Fracture Toughness.

UNIT V

Fatigue Fracture - Fatigue loading, various stages of crack propagation, load spectrum, approximation of the stress spectrum, crack growth integration, fatigue crack growth laws.

4. Books and Materials

Text Book(s)

1.Anderson, *Fracture Mechanics: Fundamentals and Applications*, CRC press, 3rd Ed.,2005.

2. Broek, *Engineering Fracture Mechanics*, Martinus Nijhoff publishers, 1982.

Reference Book(s)

1. Sidney H. Avner, *Introduction to Physical Metallurgy*, 2nd Edition,Tata McGraw-Hill, US, 2007.

2. Donald R.Askeland *Essential of Materials Science and Engineering*, Cengage Publisher, 3rd edition, USA, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1354 – PRINCIPLES OF 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 deals with workforce and management problems in industries. It also deals with the optimum utilization of the resources for achieving higher productivity. Quality and cost controls are also other important factors which contribute to the day to day supervision issues.

Course Pre/corequisites

The course has no specific prerequisite and corequisites

2. Course Outcomes (COs)

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

A1354.1 Build organization structure and managerial skills to obtain the leadership qualities.

A1354.2 Select suitable plant layout as per the requirements of production process.

A1354.3 Apply work improvement techniques in an organization for increasing the productivity

A1354.4 Choose suitable type of Plant maintenance for industrial safety.

A1354.5 Appraise social responsibilities of engineer and ways to protect our environment

3. Course Syllabus

UNIT I

Management - Definition, Henry Fayol's principles of management, types of business organization, proprietorship, partnership, joint stock, cooperative society, advantages and disadvantages.

UNIT II

O**rganization -** Definition, types of organization, types of leadership, quality of good leader, motivation, Maslow's theory of motivation, hierarchy of needs, process of communication.

Concept of project work - Project planning, market survey, project capacity, selection of site for project, types of plant layout, job, batch and mass production with their advantages and disadvantages, production planning and control, introduction to cpm and pert, comparison.

UNIT III

Material Management - Definition, functions, Purchase, objectives, different methods of purchasing, purchase procedure, comparative statement, purchase order, tender, storekeeping, store management, bin card, material issue requisition, material returned note, store ledgers,

codification of stores, inventory management, definition, functions of inventory control, advantages of inventory control.

UNIT IV

Quality - Definition, factors affecting quality, advantages of quality control, inspection, different types of inspection total quality management, meaning, principles of total quality management.

Plant Maintenance - Definition, types of maintenance, preventive maintenance, break down maintenance, total productive maintenance.

UNIT V

Industrial Safety - Meaning, accident, causes for accident, direct and indirect losses due to an accident, personal protective devices for preventions of accidents, safety department, role of safety officer, safety supervisor, safety committee, fire prevention and protection, fire triangle, principles of fire extinguishing, various classes of fire.

4. Books and Materials

Text Book(s)

O.P. Khanna*, Industrial management and engineering economics*, Khanna publishers, 8th edition, 2018.

Reference Book(s)

1. T.R. Banga & S C Sharma, *Industrial Organization and Engineering Economics*, Khanna Publishers, 5th edition, 2016.

2. P.C. Punmia & K.K. Khandelwal, *Project planning and control with PERT & CPM*, LP Publication, New Delhi, 7th edition, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1355 – FLEXIBLE MANUFACTURING SYSTEM

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

1. Course Description

This course deals with a configuration of interconnected processing workstations with computer terminals that process the end-to-end creation of a product, from loading/unloading functions to machining and assembly to storing to quality testing and data processing.

Course Pre/corequisites

A1351-Machining Processes

2. Course Outcomes (COs)

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

A1355.1 Identify FMS layouts and its significance in manufacturing process

A1355.2 Apply various material handling and storage systems as per applications

A1355.3 Differentiate cellular vs Flexible Manufacturing system for scheduling problems

A1355.4 Solve the problems on performance of computer controlling the flexible manufacturing systems

A1355.5 Plan FMS data base as per simulation of scheduling problems

3. Course Syllabus

UNIT I

FMS Introduction and Description-Need for FMS, Introduction, Basic Components of FMS, Significance of FMS, General layout and configuration of FMS, Objectives of FMS.

UNIT II

Automated Material Movement and Storage System-Introduction, types of AGV and their principle of working, advantages, limitation and general AGV guide path, robots, benefits of using industrial robots, basic components and benefits of automated storage and retrieval systems, conveyors and pallet flotation system.

UNIT III

Manufacturing Cell and Planning, Scheduling of FMS - Introduction, description and classifications of cell, unattended machining, cellular versus flexible manufacturing, FMS planning, types of flexibility, FMS application and flexibility, single, product, single batch, n - batch scheduling problem, knowledge based scheduling system.

UNIT IV

Computer Control and Software for Flexible Manufacturing Systems - Introduction, composition of FMS, hierarchy of computer control, computer control of work center and assembly lines, FMS supervisory computer control, types of software specification.

UNIT V

FMS Simulation - Application of simulation, model of FMS, simulation software, manufacturing data systems, data flow, FMS database systems, planning for FMS database.

4. Books and Materials

Text Book(s)

1. Jha, N.K "*Handbook of Flexible Manufacturing Systems*", Academic Press Inc.1991.

2. Viswanadham, N.; and Narahari, Y, *Performance Modelling of Automated Manufacturing System,* Prentice-hall, 2009.

Reference Book(s)

1. H.K. Shivanand, M.M.Benal, V.Koti, *Flexible Manufacturing Systems,* New Age International Publishers, 2012.

2. Radhakrishnan. P and Subramanian. S, *CAD/CAM/CIM*, Wiley Eastern Ltd., New Age International Ltd, 1994.

3. Groover M.P, *Automation, Production Systems and Computer Integrated Manufacturing,* Prentice Hall of India Pvt., New Delhi, 1996.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1356 - REFRIGERATION AND AIR CONDITIONING

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 refrigeration and air conditioning ideally suited to daily life. It covers various refrigeration cycles like vapour compression refrigeration systems, vapour absorption refrigeration systems. This course also provides the knowledge of psychrometry and psychometric processes used for the purpose of various air conditioning methods like summer, winter and year-round air conditioning and the applications of refrigeration and air conditioning systems. The learner will be able to estimate the efficiency of refrigeration and air-conditioning systems under various load conditions.

Course Prerequisites

A1307	Thermodynamics
A1314	Thermal Engineering-I
A1322	Thermal Engineering-II

2. Course Outcomes (COs)

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

A1356.1	Make use of the terminologies and the basic principles associated with refrigeration and air conditioning systems.
A1356.2	Distinguish between the components of refrigeration and air conditioning systems
A1356.3	Estimate the efficiency of refrigeration and air-conditioning systems under various load conditions.
A1356.4	Discuss the constructional features of domestic, industrial refrigeration and air conditioning systems.
A1356.5	Select suitable refrigeration and air-conditioning systems for domestic as well as industrial applications.

3. Course Syllabus

UNIT I

Refrigeration - Introduction, terminology and principles.

Air refrigeration - Air refrigeration cycles-reversed Carnot cycle, Bell-Coleman cycle, air refrigeration systems.

UNIT II

Vapour compression refrigeration system (VCRS) - Vapour compression refrigeration system , Carnot vapour compression refrigeration cycle, working and analysis, standard vapour

compression refrigeration system, working and analysis, effects of sub cooling and super heating, multi-pressure or compound vapour compression refrigeration systems ,methods like flash gas removal, flash inter cooling and water inter cooling.

UNIT III

Refrigerants - Selection of refrigerants and nomenclature of refrigerants.

Vapour absorption systems - Types of refrigeration systems, vapour absorption refrigeration systems, absorbent, refrigerant combinations, water-ammonia systems, water-lithium bromide system, contrast between the two systems, modified version of aqua-ammonia system with rectifier and analyzer assembly.

UNIT IV

Psychrometry - Introduction to air-conditioning, classification, ASHRAE nomenclature pertaining to air-conditioning, applications of air-conditioning, psychrometry, air - water vapour mixtures, psychrometric properties, psychrometric or air-conditioning processes, psychrometric chart

UNIT V

Air-conditioning - Mathematical analysis of air-conditioning loads, related aspects, numerical problems, different air-conditioning systems, central, station air-conditioning system, unitary air-conditioning system, window air-conditioner and packaged air-conditioner, components related to air-conditioning systems.

4. Books and Materials

Text Book(s):

S. C. Arora and Domkundwar, *A Course in Refrigeration and Air conditioning*, Dhanpatrai and sons, 2013

Reference Book(s)

1. Manohar Prasad, *Refrigeration and Air Conditioning*, New Age, 2nd edition, 2013
2. Dossat, *Principles of Refrigeration,* Pearson Education, 4th edition, 2007.
3. P.L. Ballaney, *Refrigeration and Air Conditioning,* 2nd edition, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1357 – MECHANICAL VIBRATIONS

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 Subject deals with analysing free and forced vibration of linear systems and developing efficient continuous vibrational system. The students can understand the importance of vibrations in mechanical design of machine parts. The student should be able to develop theoretical capabilities, so that they can apply the knowledge gained in this course to solve complex engineering problems.

Course Pre/corequisites

A1323 - Dynamics of Machinery

2. Course Outcomes (COs)

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

A1357.1 Identify the need and importance of vibration analysis in vibratory conditions

A1357.2 Develop the equations of motion for free and forced vibrations with damped and undamped conditions

A1357.3 Analyze frequency and time response of vibratory systems

A1357.4 Solve the problems related to single and multi-degree of vibratory systems with damped and undamped conditions.

A1357.5 Differentiate discrete and continuous systems pertain to numerical methods.

3. Course Syllabus

UNIT I

Fundamentals of Vibration–Introduction, classification of vibration systems, harmonic motion, natural frequency & response, effects of vibration, superposition of simple harmonic motions.

UNIT II

Single Degree Freedom Systems–Undamped and damped free vibrations-forced vibrations, coulomb damping, response to harmonic excitation, rotating unbalance and support excitation, vibration isolation and transmissibility.

Two Degree Freedom Systems – Free vibration of spring - coupled system - mass coupled system - Bending vibration of two degree of freedom system - Forced vibration - Vibration Absorbers.

UNIT III

Multi Degree Freedom Systems – Matrix formulation, stiffness and flexibility influence coefficients, eigen value problem, normal modes and their properties, free and forced vibration by modal analysis. Vibration measuring instruments - Vibrometer, velocity meters and accelerometers.

UNIT IV

Numerical Methods – Rayleigh's method, Dunkerely's method, Rayleigh - Ritz method. Critical speeds of shafts- Critical speeds without and with damping.

UNIT V

Continuous systems – Free vibration of strings – longitudinal oscillations of bars-traverse vibrations of beams - Torsional vibrations of shafts, self - excited vibrations, stability.

4. Books and Materials

Text Book(s)

1. G. K. Grover, *Mechanical Vibration*, Nemchand & Brothers, 8th Edition, 2009.
2. V. P. Singh, *Mechanical Vibration*, Dhanpat Rai & Co Pvt.Ltd, 3rd Edition, 2012.

Reference Book(s)

1. J.S. Rao and K. Gupta, *Introductory Course on Theory & Practice of Mechanical Vibrations*, New Age International (p) Ltd, 2nd edition, 2012.
2. B.C. Nakra and K. K. Chowdary, *Mechanical Measurements*, New Delhi,Tata McGraw-Hill, 2nd edition, 2004.
3. Leonard Meirovitch, *Elements of vibration analysis*, Tata McGraw-Hill, 2nd edition, 2007.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1358 – ENERGY 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 intends to create awareness of various aspects of energy management to the users. The course discusses various techniques of energy management applicable to industrial applications. It covers capital budgeting concepts of economics, cost analysis, depreciation methods and management programs. It imparts knowledge on conventional energy sources and their utilization along with energy conversion systems and energy auditing in industries. The student will gain knowledge in energy policies, economics which can be used in industry during energy crisis.

Course Pre/corequisites

A1352- Non-Conventional Sources of Energy

2. Course Outcomes (COs)

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

A1358.1 Apply methods of capital budgeting, depreciation and cost analysis for energy conservation.

A1358.2 Analyze the viability of energy conservation projects using suitable management technique.

A1358.3 Develop energy audit report through energy management skills and strategies

A1358.4 Apply the energy management process in various industries.

A1358.5 Assess the trade and policy environment for effective energy management.

3. Course Syllabus

UNIT I

Engineering Economics - Managerial objectives, steps in planning, Capital budgeting, Classification of costs, Interest, Types, discounting, Time value of money, Cash flow diagrams, Present worth factor, Capital recovery factor, Equal annual payments, Equivalence between cash flows.

UNIT II

Depreciation and Cost Analysis - Aims, Physical depreciation, Functional depreciation, Methods of depreciation, Capital recovery with return, Service life estimation, Morality curves. Break even analysis and break even chart, Minimum cost analysis, Benefit cost analysis, Life cycle cost analysis.

UNIT III

Project Management - Methods of investment appraisal, Adoption of the methods in energy conservation campaign, Types of projects, Purpose of project management , Classification , Role and qualities of project manager , Types of budgets , Budget committee , budgeting.

UNIT IV

Energy Management Programs - Necessary steps of energy management programmer , Concepts of Energy management , General principles of energy management , Energy management in manufacturing and process industries, Qualities and functions of Energy manager , Checklist for top management.

Energy Auditing - Objectives, Level of responsibility, Control of Energy, Uses of Energy checklists , Energy conservation, Energy index, Cost index, Pie charts, sankey diagrams, Load profiles , Types of energy audits, Energy saving potential.

UNIT V

Energy Policy, Supply and Trade - Energy resources in India, level of power generation, transmission & distribution of power. Indian energy policy, Energy trade and its economic impacts, domestic energy production, Energy transformation, distribution and energy self sufficiency.

4. Books and Materials

Text Book(s)

1. Murphy W.R and McKay G, *Energy Management*, Elsevier India Private Limited, Gurgaon, 2009

2. Albert Thumann, *Handbook of Energy Audits*, The Fairmont Press Inc., Atlanta gergia, 1979.

Reference Book(s)

1. Albert Thumann, *Plant Engineer and Management guide to Energy Conservation*, Van Nost and Reinhold Co., Newyork.

2. *Energy Audits*, E.E.O., Book-lets, U.K. 1988.

3. Craig B.Smith, "*Energy Management Principles*", Pergamon Press.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1359 – PROJECT 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

The course deals with managing projects with a special focus on every phase such as project planning, execution, monitoring and evaluation. It also deals with finding optimal project duration and probability of completing the project within scheduled time. This course helps students to handle the future projects in an efficient manner.

Course Pre/corequisites

The course has no specific prerequisite and corequisites

2. Course Outcomes (COs)

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

A1359.1 Apply project management practices to the launch of new programs, products, services and events.

A1359.2 Apply the risk management plan to find the risk to stakeholders.

A1359.3 Evaluate project characteristics at various stages of a project.

A1359.4 Make use of project management tools and techniques for successful completion of the project

A1359.5 Appraise the role of project manager in organizational change.

3. Course Syllabus

UNIT I

Project management - Introduction, project characteristics, project life cycle, project identification, formulation and implementation.

UNIT II

Project Appraisal - Project planning, steps in project planning, scheduling, project appraisal-feasibility study, project risk analysis.

UNIT III

Project Finance - Project cost estimation, project financing and investment criteria, project evaluation techniques- pay back period, accounting rate of return, net present value, internal rate of return, profitability index.

UNIT IV

Project Network analysis - 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.

UNIT V

Organizational Behaviour in Project Management - Organizational structure and integration, role of project manager, roles in the project team, project stakeholder engagement, leadership in project management, participative management, team building approach, conflict management in projects.

4. Books and Materials

Text Book(s)

1. Prasanna Chandra, *Projects, Planning, Analysis, Selection, Financing, Implementation and review*, 6th edition, Tata Mc Graw Hill,2008
2. R. Paneerselvam, P. Senthil Kumar, *Project Management*, Prentice Hall of India, 2009.

Reference Book(s)

K. Nagrajan, *Project Management*, New Age International Publishers, 7th edition, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1360 – AUTOMOBILE 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 classify engines, chassis, fuel supply systems, cooling methods, lubrication methods, ignition systems, generating systems, suspension systems, transmission system, steering mechanism and braking methods, and get the working knowledge of assembly of various components of layout and of various electrical equipment of an automobile.

Course Pre/co requisites

A1307- Thermodynamics
A1314 –Thermal Engineering-I

A1322- Thermal Engineering-II

2. Course Outcomes (COs)

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

A1360.1 Identify components of various automobile systems including turbo chargers and super chargers

A1360.2 Examine the environmental implications of automobile emissions

A1360.3 Analyze brakes, steering and suspension systems of engine for better performance.

A1360.4 Analyze the effect of electrical and transmission system on the performance of an automobile engine.

A1360.5 Discuss the purpose and methods of various automobile systems and their applications.

3. Course Syllabus

UNIT I

Introduction - Components of a Four Wheeler Automobile , Chassis and Body , Power Unit ,Power Transmission , Rear Wheel Drive, Front Wheel Drive, Four Wheel Drive , Types of Automobile Engines, Engine Construction, Turbo Charging and Super Charging , Oil Filters, Oil Pumps , Crank Case Ventilation.

UNIT II

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 - Their Merits And Demerits.

UNIT III

Electrical System - Charging Circuit, Generator, Current, Voltage Regulator , Starting System, Bendix Drive, Mechanism of Solenoid Switch, Lighting Systems, Horn, Wiper, Fuel Gauge , Oil Pressure Gauge, Engine Temperature Indicator.

UNIT IV

Transmission System - Cone Clutch, Single Plate Clutch, Multi Plate Clutch, Magnetic and Centrifugal Clutches, Fluid Fly Wheel, Gear Box- Types: Sliding Mesh, Constant Mesh, Synchromesh, Epi-Cyclic, Over Drive, Torque Converter.

Propeller Shaft, Hotch , Kiss Drive, Torque Tube Drive, Universal Joint, Differential, Rear Axles.

Steering System - Steering Geometry, Camber, Castor, King Pin Rake, Combined Angle Toe-In, Center Point Steering. Types Of Steering Mechanism , Ackerman Steering Mechanism, Davis Steering Mechanism, Steering Gears , Types, Steering Linkages.

UNIT V

Suspension System - Objects of Suspension Systems, Rigid Axle Suspension System, Torsion Bar, Shock Absorber, Independent Suspension System.

Braking System - Mechanical Brake System, Hydraulic Brake System, Pneumatic and Vacuum Brake Systems.

4. Books and Materials

Text Book(s)

1. Kirpal Singh, *Automobile Engineering*, Vol. 1 & Vol. 2, Standard Publishers Distributors, 13th edition, 2013.

2. William Crouse, *Automobile Engineering*, Tata McGraw Hill, 10th edition, New Delhi, 2006.

Reference Book(s)

1. R.K.Rajput, *Automobile Engineering*, 1st edition, Laxmi Pub, New Delhi, 2013.

2. K.K.Ramalingam, *Automobile Engineering*, SciTech Pub, 2nd edition, New Delhi, 2010.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1361 – TRIBOLOGY

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

1. Course Description

Course Overview

This course deals with the science and engineering of interacting surfaces in relative motion. It includes the study and application of the principles of friction, lubrication, and wear. Tribology is highly interdisciplinary.

Course Pre/corequisites

A1003 - Engineering Physics

A1330 - Design of Machine members-II

2. Course Outcomes (COs)

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

A1361.1 Make use of the fundamentals of tribology and associated parameters in designing Bearings

A1361.2 Apply friction and wear theories and measurement method on engineering applications

A1361.3 Analyze the requirements of hydrodynamic journal and plane slider bearings for a given application.

A1361.4 Solve problems pertaining to load carrying capacity and coefficient of friction

A1361. 5 Identify the commonly used bearing materials and their properties.

3. Course Syllabus

UNIT I

Introduction to tribology - Historical background, practical importance, and subsequent use in the field. Lubricants, types and specific field of applications. Properties of lubricants, viscosity, its measurement, effect of temperature and pressure on viscosity, lubrication types, standard grades of lubricants and selection of lubricants.

UNIT II

Friction- Origin, friction theories, measurement methods, friction of metals and non-metals.

Wear - Classification and mechanisms of wear, delamination theory, debris analysis, testing methods and standards. Related case studies.

UNIT III

Hydrodynamic journal bearings - Introduction to idealized journal bearing, load carrying capacity, condition for equilibrium, Sommerfeld's number and it's significance; partial bearings, end leakages in journal bearing, numerical examples on full journal bearings only.

UNIT IV

Plane slider bearings with fixed/pivoted shoe - Pressure distribution, Load carrying capacity, coefficient of friction, frictional resistance in a fixed/pivoted shoe bearing, center of pressure, numerical examples.

Hydrostatic Lubrication - Introduction to hydrostatic lubrication, Hydrostatic step bearings, Load carrying capacity and oil flow through the hydrostatic step bearing, Numerical examples.

UNIT V

Bearing Materials - Commonly used bearings materials, and properties of typical bearing materials, advantages and disadvantages of bearing materials.

Introduction to Surface engineering - Concept and scope of surface engineering, surface modification, transformation hardening, Surface melting, thermo chemical processes.

4. Books and Materials

Text Book(s)

1. B. Bhushan, *Introduction to Tribology*, John Wiley & Sons, Inc., New York, 2002.
2. Prasanta Sahoo, *Engineering Tribology*, PHI Learning Private Ltd, New, Delhi , 2011.

Reference Book(s)

1. B.C.Majumdar, *Introduction to Tribology in bearings*, Wheeler Publishing, 2010.
2. I. M.Hutchings, *Tribology, Friction and Wear of Engineering Material*, Edward Arnold, London, 1992
3. B. Bhushan, B.K. Gupta "*Handbook of tribology: materials, coatings and surface treatments*, McGraw-Hill, 1997

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1362 – PRECISION 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 advanced concepts of precision and ultra precision machining methods. It provides detailed information regarding principles and measurement of the components using precision instruments. The student will utilize this knowledge in industry for obtaining accurate final products.

Course Pre/corequisites

A1351 Machining Processes

2. Course Outcomes (COs)

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

A1362.1 Apply accuracy and tolerances for parts, assemblies according to ISO standards

A1362.2 Categorize tolerances using principle of dimensional chains for individual features of a part or assembly

A1362.3 Apply selective assembly concept for quality and economic production.

A1362.4 Evaluate part and machine tool accuracies using different precision methods.

A1362.5 Analyze the causes for dimensional and geometrical errors prior to and during machining

3. Course Syllabus

UNIT I

Concepts of Accuracy - Introduction, concept of accuracy of machine tools, spindle and displacement accuracies, accuracy of numerical control systems, errors due to numerical interpolation displacement measurement system and velocity lags.

UNIT II

Geometric Dimensioning and Tolerancing - Tolerance zone conversions, surfaces, features of size, datum features, datum oddly configured and curved surfaces as datum features

Datum Systems - Design of freedom, grouped datum systems, different types, two and three mutually perpendicular grouped datum planes

UNIT III

Tolerance Analysis - Process capability, mean, variance, skewness, kurtosis, process, capability metrics, cp, cpk, cost aspects, feature tolerances, geometric tolerances.

UNIT IV

Tolerance Charting Techniques - Operation sequence for typical shaft type of components, preparation of process drawings for different operations, tolerance worksheets and centrally analysis.

Surface Finish - Review of relationship between attainable tolerance grades, different machining process, cumulative effect of tolerances sure fit law, normal law and truncated normal law.

UNIT V

Measuring Systems Processing - In processing or in-situ measurement of position of processing point-post process, machine measurement of dimensional features, surface-mechanical and optical measuring systems

4. Books and Materials

Text Book(s):

Murthy R. L, *Precision Engineering in Manufacturing*, New Age International (P) limited, 5th edition, 2015.

Reference Book(s):

1. James D. Meadows, *Geometric Dimensioning and Tolerancing*, Marcel Dekker Inc publications, 3rd edition, 2012

2. Matousek, *Engineering Design – A systematic Approach*, Blackie & Son Ltd, London, 2nd edition, 2012

OPEN ELECTIVES

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 AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1181 – BASIC CIVIL ENGINEERING

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

1. Course Description

Course Overview

This course is designed to impart the basic knowledge about civil engineering to the students of other branches of engineering. The course includes materials for construction, basic surveying and other basic concepts 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1183 – DISASTER MANAGEMENT

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

1. Course Description

Course Overview

This course provides knowledge on environmental hazards and disasters. The syllabus includes the basics of endogenous and exogenous hazards and gives a suitable picture on the different types of hazard and disasters. This course will enable the student to apply different management techniques to the hazards and disasters.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1183.1 Classify different kind of hazards/disasters and their effects on environment

A1183.2 Analyze the causes of hazards/disasters which effects human life

A1183.3 Apply disaster management through engineering applications

A1183.4 Apply suitable mitigation measures to minimize the effects of hazards and disasters

3. Course Syllabus

UNIT I

Environmental Hazards & 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A1184 – WATER RESOURCES CONSERVATION

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

1. Course Description

Course Overview

This course introduces the great need to conserve and plan the water resources in more efficient way because of urbanization and depletion of water resources. The course content enables the students to learn water hydrology, importance of water conservation and methods to conserve water resources.

Course Pre/corequisites

The Course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A1184.1 Interpret ground and surface water utilization for conservation of water resources

A1184.2 Apply the concepts of artificial ground water recharge to increase ground water level

A1184.3 Make use of the concepts of harvesting for preservation of water

A1184.4 Utilizenew technologies like ion exchange and UV radiation techniques to recycle and reuse waste water

A1184.5 Plan efficient use of water resources with minimum energy

3. Course Syllabus

UNIT I

Ground and surface water utilization- Hydrologic cycle, water budget, ground water level fluctuations and environmental influence.

UNIT II

Artificial ground water recharge- Concept and methods of artificial ground water recharge mounds & 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1281 – FUNDAMENTALS OF ELECTRICAL ENGINEERING

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A1281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A1281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.

A1281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A1281.4 Test the Performance of DC machines, AC machines and single-phase transformers.

3. Course Syllabus

UNIT I

DC Circuits: Circuit Concept, Types of Network Elements, ohm's Law, types of Sources Voltage - Current Relationship for Passive element (R,L&C), Kirchhoff's Laws, Network Reduction Techniques: Series, Parallel, combination of Series and Parallel, Delta - Star Transformation, loop and Nodal Analysis.

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

UNIT II

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

UNIT III

D.C Generators: Constructional details of D.C. generator, Principle of Operation of D.C. generators, Types of D.C Generators, E.M.F Equation.

D.C Motors: Principle of Operation of DC Motors, Back emf, Torque Equation, Swinburne's test, speed control of DC motors by armature and field control methods.

UNIT IV

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

UNIT V

3-Phase Induction Motors: Principle of Operation, Types of induction motors, Slip, Torque equation, Torque-Slip characteristics.

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

1. A Sudhakar, Shyammohan S Palli, "*Circuits and Networks*", Tata McGraw-Hill, 4th edition.
2. D. C. Kulshreshtha," *Basic Electrical Engineering"*, McGraw Hill, 2009.
3. L. S. Bobrow, "*Fundamentals of Electrical Engineering"*, Oxford University Press, 2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1381 – OPTIMIZATION TECHNIQUES

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

1. Course Description

Course Overview

This course deals with modelling and optimization of the problems with limited resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

Course Pre/corequisites

The course has no specific prerequisite and Corequisite

2. Course Outcomes (COs)

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

A1381.1 Apply various Operations Research models and methods to real world problems.

A1381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A1381.3 Evaluate various alternatives available to find optimal solution for real world problems.

A1381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A1381.5 Decide the best operating policy for the efficient use of resources.

3. Course Syllabus

UNIT I

Operations Research: Scope, O.R models, Linear Programming - Formulation, graphical method, simplex method, big -M method and special cases.

UNIT II

Assignment Model: Formulation, optimal solution by Hungarian method, maximization problem, balanced and unbalanced problems, restriction models.

Sequencing Models: Introduction, Johnson's Rule, processing n jobs through two machines, processing n jobs through three machines and processing n jobs through m machines.

UNIT III

Transportation Problem: Introduction, finding initial basic feasible solutions, optimality test, alternate solutions and unbalanced transportation problem.

UNIT IV

Game Theory: Introduction, minimax (maximin) method of optimal strategies, saddle point, value of the game, rectangular games without saddle point, dominance principle, graphical method.

Queuing Theory: Introduction, terminology, single channel models with finite queue length and non-finite queue length.

UNIT V

Introduction to Project Management: Terminology, methods of finding critical path -critical path method (CPM), project evaluation and review technique (PERT) - probability of completing the project within scheduled time and crashing.

4. Books and Materials

Text Book(s)

1. S.D. Sharma, *Operations Research*, New Delhi: Kedarnath Publications, 2017
2. S.R. Yadav and A.K. Malik, *Operations Research*, New Delhi: Oxford University Press, 2014.

Reference Book(s)

3. Hamdy Abdelaziz Taha,*Operations Research*: *an Introduction*, 9th edition, Pearson, Boston,2015.
4. 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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1481 – BASIC ELECTRONICS

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

1. Course Description

Course Overview

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

Course Pre/corequisites

A1003 –Engineering Physics

2. Course Outcomes (COs)

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

A1481.1 Analyze the operation and characteristics of diodes and transistors.

A1481.2 Analyze various applications of diodes and transistors.

A1481.3 Make use of Boolean algebra postulates to minimize boolean functions.

A1481.4 Construct and analyze various combinational and sequential circuits used in digital systems.

3. Course Syllabus

UNIT I

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

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

UNIT II

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

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

UNIT III

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

UNIT IV

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

UNIT V

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

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

4. Books and Materials

Text Book(s)

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

Reference Book(s)

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1483 – FUNDAMENTALS OF IOT

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

1. Course Description

Course Overview

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

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

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

A1483.1 Analyze 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1581 –BASIC DATA STRUCTURES

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

1. Course Description

Course Overview

The aim of this course is to provide insight in organizing data types logically to access and configure the data. The concepts of linear and non-linear data structure algorithms are discussed. It improves the problem-solving ability of a learner to a great extent which can be applied in various fields of engineering.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

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

A1581.1 Analyze the time and space complexities of algorithms

A1581.2 Apply various operations on linear data structures

A1581.3 Design searching and sorting techniques for a given application

A1581.4 Develop nonlinear programming for optimization techniques

3. Course Syllabus

UNIT I

Introduction and Overview: Definition, Concepts of Data Structures, Overview and Implementation of Data Structures.

UNIT II

Linear Data Structures: Stacks- Introduction, Definition, Representation of Stack, Operations on Stacks, Applications of Stacks, Queues- Introduction, Definition, Representations of Queues, Various Queue Structures, Applications of Queues.

UNIT III

Linked lists: Definition, Single linked list, Circular linked list, Double linked list, Circular Double linked list, Application of linked lists.

UNIT IV

Sorting and Searching: Sorting- Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Time complexity. Searching - Sequential Search, Binary Search, time complexity.

UNIT V

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

4. Books and Materials

Text Book(s)

1. Debasis Samanta. *Classic Data Structures*. 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A1582 – FUNDAMENTALS OF DBMS

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

1. Course Description

Course Overview

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

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

A1582.1	Apply suitable data models for given application
A1582.2	Design database using integrity constraints and ACID properties
A1582.3	Construct optimized SQL queries to solve real time problems
A1582.4	Apply suitable normal form to eliminate data redundancy
A1582.5	Choose appropriate index structure to improve performance

3. Course Syllabus

UNIT I

Introduction: Basics of Database System Applications, Principle of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages - DDL, DML, ER diagrams.

UNIT II

Relational Model: Fundamentals of Relational Model - Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Views, ACID Properties.

UNIT III

SQL: Basic SQL Queries, Introduction to Sub queries, Correlated Sub queries, Set - Comparison Operators, Aggregate Operators, NULL values, logical operators, Joins.

UNIT IV

Normalizations: Redundancy Issues, Decompositions, Functional Dependencies, various Normal Forms.

UNIT V

Data on External Storage: File Organization and various indexing structures.

4. Books and Materials

Text Book(s)

1. Raghurama Krishnan, *Johannes Gehrke, Database Management Systems,*McGraw-Hill Education, 3rd edition, 2014.

Reference Book(s)

1. A. Silberschatz, H.F. Korth, Sudarshan, Database *System Concepts*, McGraw Hill, 6th edition, 2012.
2. RamezElmasri, Shamkat B. Navathe, *Database Systems,* Pearson Education, 6th edition 2009.

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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*', 1stedition, 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

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).

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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.

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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.

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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=2mjSDIBaUlMthevirtualinstructor.com/foreshortening.html
6. https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdfwww.bizfilings.com›Home › Marketing› Product Development
7. https://canvas.uw.edu/courses/1023376/assignments/syllabus

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.