ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

MECHANICAL ENGINEERING

B.TECH 4 YEAR UG COURSE

(Applicable for the batches admitted from 2016-2017)

REGULATION: R16

(I, II, III & IV Year Syllabus)

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
Bhaskar Nagar, Yenkapally, Moinabad Mandal, R.R. District,
Hyderabad – 500 075, Telangana State, India
Email: principal@jbiet.edu.in, Website: www.jbiet.edu.in

J.B. INSTITUTE OF ENGIEERING & TECHNOLOGY
UGC AUTONOMOUS
Institute Vision & Mission

Vision

To be a centre of excellence in engineering and management education, research and application of knowledge to benefit society with blend of ethical values and global perception.

Mission:

- To provide world class engineering education, encourage research and development.
- To evolve innovative applications of technology and develop entrepreneurship.
- To mould the students into socially responsible and capable leaders.

DEPARTMENT OF MECHANICAL ENGINEERING
Department Vision and Mission

Vision

To nurture excellence in the field of Mechanical engineering by imparting technical core values and instruction to the learners and to mold the department into a center for academic excellence through promoting higher education and advanced research to provide technical services at global competence.

Mission

- To impart highest quality education to the students to build their capacity and enhancing their skills to make them globally competitive mechanical engineers and maintain state of art research facilities to provide collaborative environment that stimulates faculty, staff and students with opportunities to create, analyze, apply and disseminate knowledge.

- To develop alliances with national level R&D organizations, educational institutions, industry and alumni for excellence in teaching, research and placements.

- To provide the students with academic environment of excellence, leadership, ethical, social guidelines and lifelong learning needed for a long self-employment career.

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (JBIET)
UGC AUTONOMOUS
Bhaskar Nagar, Moinabad, Hyderabad – 500075, Telangana, India

ACADEMIC REGULATIONS FOR B.TECH. REGULAR STUDENTS

WITH EFFECT FROM THE ACADEMIC YEAR 2016-17 (R-16)

1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T)

1.1 JBIET offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year 2016-17 in the following branches of Engineering:

Sl. No.	Branch
1	Civil Engineering
2	Electrical and Electronics Engineering
3	Mechanical Engineering
4	Electronics and Communication Engineering
5	Computer Science and Engineering
6	Information Technology
7	Electronics and Computer Engineering
8	Mining Engineering

2.0 Eligibility for Admission

2.1 Admission to the under graduate programme shall be made either on the basis of the merit rank obtained by the qualified candidate in entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the government from time to time.

2.2 The medium of instructions for the entire under graduate programme in E&T will be **English** only.

3.0 B.Tech. Programme structure

3.1 A student after securing admission shall pursue the under graduate programme in B.Tech. in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course.

Each semester is structured to provide 24 credits, totalling to 192 credits for the entire B.Tech. programme. Each student shall secure 192 credits (with CGPA ≥ 5) required for the completion of the under graduate programme and award of the B.Tech. degree.

3.2 UGC/ AICTE specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.

3.2.1 Semester scheme

Each under graduate programme is of 4 academic years (8 semesters) with the academic year being divided into two semesters of 22 weeks (≥ 90 instructional days) each, each semester having - '**Continuous Internal Evaluation (CIE)**' and '**Semester End Examination (SEE)**'. **Choice Based Credit System (CBCS)** and **Credit Based Semester System (CBSS)** as indicated by UGC and curriculum / course structure as suggested by AICTE are followed.

3.2.2 Credit courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.

1. One credit for one hour/ week/ semester for theory/ lecture (L) courses.
2. One credit for two hours/ week/ semester for laboratory/ practical (P) courses or Tutorials (T).

Courses like Environmental Studies, Professional Ethics, Gender Sensitization lab are identified as **mandatory courses**. These courses **will not carry any credits**.

3.2.3 Subject Course Classification

All subjects/ courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. JBIET has followed almost all the guidelines issued by AICTE/UGC.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes mathematics, physics and chemistry subjects
2		ES - Engineering Sciences	Includes fundamental Engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to humanities, social sciences and management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5		Project Work	B.Tech. project or UG project or UG major project
6		Industrial training/ Mini- project	Industrial training/ Internship/ UG Mini-project/Mini-project

7		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
8	Elective Courses (EℓC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
9		OE – Open Electives	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
10	Mandatory Courses (MC)	-	Mandatory courses (non-credit)

4.0 Course registration

4.1 A 'faculty advisor or counsellor' shall be assigned to a group of 15 students, who will advise student about the under graduate programme, its course structure and curriculum, choice/option for subject s/ courses, based on their competence, progress, pre-requisites and interest.

4.2 The academic section of the college invites '**registration forms**' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be **completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'**.

4.3 A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor/counsellor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor/ counsellor and the student.

4.4 A student may be permit ted to register for the subjects/ courses of **choice** with a total of 24 credits per semester (minimum of 20 credits and maximum of 28 credit s per semester and permitted deviation of ± 17%), based on **progress** and SGPA/ CGPA, and completion of the '**pre-requisites'** as indicated for various subjects/ courses, in the department course structure and syllabus contents. However, a **minimum** of 20 credits per semester must be registered to ensure the '**studentship**' in any semester.

4.5 Choice for 'additional subjects/ courses' to reach the maximum permissible limit of 28 credits (above the typical 24 credit norm) must be clearly indicated, which needs the specific approval and sig nature of the faculty advisor/ counsellor.

4.6 If the student submits ambiguous choices or multiple options or erroneous entries during **on-line** registration for the subject(s) / course(s) under a given/ specified course group/ category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.

4.7 Subject/ course options exercised through **on-line** registration are fin al and **cannot** be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration b y the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the head of the department, with due notification and time-framed schedule, within the **first week** after the commencement of class-work for that semester.

4.8 Dropping of subjects/courses may be permitted, only after obtaining prior approval from the faculty advisor/counsellor (subject to retaining a minimum of 20 credits), '**within a period of 15 days**' from the beginning of the current semester.

4.9 Open electives: The students have to choose one open elective (OE -I) in III year I semester, one (OE-II) in III year II semester, and one (OE-III) in IV year II semester, from the list of open electives given. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.10 Professional electives: students have to choose professional elective – I (PE-I), professional elective – II (PE-II) in III year II semester, Professional electives – III (PE-III), Professional electives – IV(PE-IV) in IV year I semester, Professional electives – V (PE-V), Professional electives – VI (PE-VI) in IV year II semester, from the list of professional electives given. However, the students may opt for professional elective subjects offered in the related area.

5.0 Subjects/courses to be offered

5.1 A typical section (or class) strength for each semester shall be 60.

5.2 A subject/ course may be offered to the students, **only if** a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).

5.3 More than **one faculty member** may offer the **same subject** (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on - '**first com e first serve** basis and CGPA criterion' (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

5.4 If more entries for registration of a subject come into picture, then the Head of Department concerned shall decide, whether or not to offer such a subject/ course for **two (or multiple) sections**.

6.0 Attendance requirements:

6.1 A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses (excluding attendance in mandatory courses Environmental Science, Professional Ethics, Gender Sensitization Lab, NCC/ NSO and NSS) for that semester.

6.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

6.3 A stipulated fee shall be payable towards condoning of shortage of attendance.

6.4 Shortage of attendance below 65% in aggregate shall in **no** case be condoned.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

6.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7.0 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 academic requirements and earned the credits allotted to each subject/course, if student secures not less than 35 % marks (26 out of 75 marks) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing **'C'** grade or above in that subject/ course.

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to UG mini-project and seminar, if student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student would be treated as failed, if student (i) does not submit a report on UG mini-project, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in UG mini-project/ seminar evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if student fails in such 'one reappearance' evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	i. Regular course of study of first year second semester. ii. Must have secured at least 24 credits out of 48 credits i.e., 50% of credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	i. Regular course of study of second year second semester. ii. Must have secured at least 58 credits out of 96 credits i.e., 60% of credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	i. Regular course of study of third year second semester. ii. Must have secured at least 86 credits out of 144 credits i.e., 60% of credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.4 A student shall register for all subjects covering 192 credits as specified and listed in the course structure, fulfils all the attendance and academic requirements for 192 credits, 'earn all 192 credits' by securing SGPA $\geq$ 5.0 (in each semester) and CGPA (at the end of each successive semester) $\geq$ 5.0 to successfully complete the under graduate programme.

7.5 After securing the necessary 192 credits as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from these 192 credits earned;

resulting in 186 credits for under graduate programme performance evaluation, i.e., the performance of the student in these 186 credits shall alone be taken into account for the calculation of 'the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account)' , and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

7.6 If a student registers for some more '**extra subjects'** (in the parent department or other **departments**/branches of Engineering.) other than those listed subjects totaling to 192 credits as specified in the course structure of his department, the performances in those '**extra subjects**' (although evaluated and graded using the same procedure as that of the required 192 credits) will not be taken into account while calculating the SGPA and CGPA. For such '**extra subjects'** registered, % of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations 6 and 7.1 – 7.5 above.

7.7 A student eligible to appear in the end semester examination for any subject/ course, but absent from it or failed (thereby failing to secure **'C'** grade or above) may reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, CIE assessed earlier for that subject/ course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.

7.8 A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the next academic year for fulfilment of academic requirement s**. The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which student has been detained.

7.9 A student detained **due t o lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which student has been readmitted shall be applicable to him.

8.0 Evaluation - Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including practical's and UG major project) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End-Examination).

8.2 For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of one objective paper, one descriptive paper and one assignment. The objective paper and the essay paper shall be for 10 m arks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for essay paper). The objective paper is set with 20 bits of multiple choice, fill-in the blanks and matching type of questions for a total of 10 marks. The essay paper shall contain 4 full

questions out of which, the student has to answer 2 questions, each carrying 5 marks. While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus. Five marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-examination, and the second assignment should be submitted before the conduct of the second mid-examination. The total m arks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each student in internals/sessionals. If any student is absent from any subject of a mid-term examination, an on-line test will be conducted for him by the university. The details of the question paper pattern are as follows,

- The end semester examinations will be conducted for 75 marks consisting of two parts viz. i) **Part- A** for 25 marks, ii) **Part - B** for 50 marks.
- Part-A is compulsory question which consists of ten sub-questions. The first five sub-questions are from each unit and carry 2 marks each. The next five sub-questions are one from each unit and carry 3 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each.
- Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

8.3 For practical subjects there shall be a continuous internal evaluation during the semester for 25 sessional marks and 75 semester end examination marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The semester end examination shall be conducted with an external examiner and the laboratory teacher. The external examiner s hall be appointed from the clusters of colleges which are decided by the examination branch of the university

8.4 For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing) and estimation, the distribution shall be 25 marks for continuous internal evaluation (15 marks for day-to-day work and 10 m arks for internal tests) and 75 marks for semester end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.

8.5 There shall be an UG mini-project, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation. The UG mini -project shall be

submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 marks. The committee consists of an external examiner, Head of the Department, supervisor of the UG mini-project and a senior faculty member of the department. There shall be no internal marks for UG mini-project

8.6 There shall be a seminar presentation in IV year II semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report and submit it to the department. It's hall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 marks. There shall be no semester end examination for the seminar.

8.7 Out of a total of 100 m arks for the UG major project, 25 marks shall be allotted for internal evaluation and 75 marks for the end semester examination (viva voce). The end semester examination of the UG major project shall be conducted by the same committee as appointed for the UG mini-project. In addition, the UG major project supervisor shall also be included in the committee. The topics for UG mini project, seminar and UG major project shall be different from one another. The evaluation of U G major project shall be made at the end of IV year II semester. The internal evaluation shall be on the basis of two seminars given by each student on the topic of UG major project.

8.8 The laboratory records and internal test papers shall be preserved in the institution for two Semesters.

8.9 For mandatory courses viz. environmental studies, professional ethics and gender sensitization lab, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course.

8.10 For mandatory courses NCC/ NSO and NSS, a '**satisfactory participation certificate'** shall be issued to the student from the authorities concerned, only after securing ≥ 65% attendance in such a course.

8.11 No marks or letter grade shall be allotted for all mandatory/non-credit courses.

9.0 Grading procedure

9.1 Marks will be awarded to indicate the performance of student in each theory subject, laboratory / practical's, seminar, UG mini project and UG major project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

9.2 As a measure of the performance of student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

9.3 A student obtaining '**F'** grade in any subject shall be deemed to have '**failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

9.4 A student who has not appeared for examination in any subject, '**Ab'** grade will be allocated in that subject, and student shall be considered '**failed'**. Student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

9.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

9.6 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (C P) = grade point (GP) x credits …. For a course

9.7 The student passes the subject/ course only when **GP $\geq$ 5 ('C' grade or above)**

9.8 The semester grade point average (SGPA) is calculated by dividing the sum of credit points ($\sum$CP) secured from all subjects/courses registered in a semester, by the total numbers of credits registered during that semester. SGPA is rounded off to **two** decimal

places. SGPA is thus computed as

SGPA = $\{\sum_{i=1}^{N} C_i G_i\}$ **/** $\{\sum_{i=1}^{N} C_i\}$ **. . . . . For each semester.**

Where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects **'registered'** for the semester (as specifically required and listed under the course structure of the parent department). $\mathbf{G_i}$ is the no. of credits allotted to the i^{th} subject, and $\mathbf{G_i}$ represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

9.9 The cumulative grade point average (CGPA) is a measure of the overall cumulative performance4 of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

CGPA = $\{\sum_{j=1}^{M} C_j G_j\}$ **/** $\{\sum_{j=1}^{N} C_j\}$ **. . . . . For all S semester registered (i.e., up to and inclusive of S semester, S** $\geq$ **2),**

Where '**M'** is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has **'registered'** i.e., from the 1^{st} semester onwards up to and inclusive of the 8^{th} semester, **'j'** is the subject indicator index (takes into account all subjects for 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for the j^{th}subject. After registration and completion of first year first semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

SGPA = 152/21 = 7.24

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
I Year I Semester				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A+	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B+	7	3 x 7 = 21
Course 6	3	A	8	3 x 8 = 24
I Year II Semester				
Course 7	4	B+	7	4 x 7 = 28
Course 8	4	O	10	4 x 10 = 40
Course 9	4	A	8	4 x 8 = 32
Course 10	3	B	16	3 x 6 = 18
Course 11	3	C	5	3 x 5 = 15
Course 12	3	A+	9	3 x 9 = 27
Total Credits =	42		Total Credit Points=	327

CGPA = 327/42 = 7.79

9.10 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off'** values of the CGPAs will be used.

9.11 For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/ courses (securing **F** grade) will also be taken into account, and the credits of such subjects/ courses will also be included in the multiplications and summations. After passing the failed subject(s) newly secured letter grades will be taken into account for calculation of SGPA and CGPA. However, mandatory courses will not be taken into consideration.

10.0 Passing standards

10.1 A student shall be declared successful or 'passed' in a semester, if student secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA ≥ 5.00 at the end of that particular semester); and a student s hall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

11.2 For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

% of Marks = (final CGPA – 0.5) x 10

12.0 Award of degree

12.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 192 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified'** for the award of the B.Tech. degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with final CGP A (at the end of the under graduate programme) ≥ 8.00, and fulfilling the following conditions -

(i) Should have passed all the subjects/courses in '**first appearance'** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii) Should have secured a CGPA ≥ 8.00, at the end of each of the 8 sequential semesters, starting from first year first semester onwards.

(iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in '**first class with distinction'**.

12.4 Students with final CGP A (at the end of the under graduate program me) ≥ 6.50 but < 8.00, shall be placed in '**first class'**.

12.5 Students with final CGP A (at the end of the under graduate program me) ≥ 5.50 but < 6.50, shall be placed in '**second class'**.

12.6 All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 5.50, shall be placed in '**pass class**'.

12.7 A student with final CGP A (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

12.8 Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of '**First Rank**' and '**Gold Medal**'.

13.0 Withholding of results

13.1 If the student has not paid the fees to the university/college at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory regulations

14.1 A student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for re admission to the same subjects/courses (or equivalent subjects/ courses, as the case may be), and same professional electives/open electives (or from set/category of elective s or equivalents suggested, as the case m ay be) as and when they are offered (within the time-frame of 8 years from the date of commencement of student's first year first semester).

15.0 Student transfers

15.1 There shall be no branch transfers after the completion of admission process.

15.2 There shall be no transfers from the college/stream to another college.

16.0 Scope

16.1 The academic regulations should be read as a whole, for the purpose of any interpretation.

16.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.

16.3 The institution may change or amend the academic regulations, course structure or syllabi at any time if necessary, and the changes or amendments made shall be applicable to all students with effect from the date notified by the JBIET authorities.

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (JBIET)
UGC AUTONOMOUS
Bhaskar Nagar, Moinabad, Hyderabad – 500075, Telangana, India

Academic Regulations for B.Tech. (Lateral Entry Scheme) w.e.f the A Y 2017-18

1. **Eligibility for award of B. Tech. Degree (LES)**

   The LES students after securing admission shall pursue a course of study for not less than three academic year s and not more than six academic years.

2. The student shall register for 144 credits and secure 144 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree. **Out of the144 credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects resulting in 138 credits for B.Tech programme performance evaluation**.**
3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.
4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).
5. **Promotion Rule:**

S. No	Promotion	Conditions to fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 29 credits out of 48 credits i.e., 60% of credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 58 credits out of 96 credits i.e., 60% of credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. **All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).**

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No.	**Nature of Malpractice/Improper conduct**	**Punishment**
	If the student:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	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 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 the subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled and sent to the university.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and UG major project) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive

		semesters from class work and all university examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of sea. If the imposter is and outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the answer book or additional sheet or takes our or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in the subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	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 subject.
6.	Refuses to obey the orders of the chief superintendent/assistant – superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizers 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 writer or by signs or by spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects 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 is registered against them.

	engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeiture of seat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeiture of seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.

10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of performance in that subject and all other subjects the student has appeared including practical examinations and UG major project of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the university for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators will be further investigated through a committee and suitable punishment will be given to the students as mentioned by the University guidelines.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist., Telangana-500075

MECHANICAL ENGINEERING

COURSE STRUCTURE – R16

I B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E110A	Mathematics – I	3	1-0-0	3
2	E110G	Mathematics – II	4	1-0-0	4
3	E110H	Engineering Physics	3	0-0-0	3
4	E115A	Computer Programming in C	3	0-0-0	3
5	E113A	Engineering Mechanics	3	1-0-0	3
6	E113B	Engineering Graphics	2	0-0-4	4
7	E1103	Engineering Physics Lab	0	0-3-0	2
8	E1104	Computer Programming in C Lab	0	0-3-0	2
9	E110E	*Environmental Studies	2	0-0-0	0
		Total	**20**	**3-6-4**	**24**

I B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E120D	Applied Physics	3	0-0-0	3
2	E120G	Engineering Chemistry	4	0-0-0	4
3	E120C	Mathematics – III	4	1-0-0	4
4	E120H	Professional Communication in English	3	0-0-0	3
5	E122A	Basic Electrical & Electronics Engineering	4	0-0-0	4
6	E1201	Engineering Chemistry Lab	0	0-3-0	2
7	E1204	English Language Communication Skills Lab	0	0-3-0	2
8	E1205	Engineering Workshop	0	0-3-0	2
9	E120F	*Professional Ethics	2	0-0-0	0
		Total	**20**	**1-9-0**	**24**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist., Telangana-500075

MECHANICAL ENGINEERING

COURSE STRUCTURE – R16

II B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E210A	Numerical Techniques and Transforms	3	1-0-0	3
2	E213A	Mechanics of Solids	4	1-0-0	4
3	E213B	Thermodynamics	4	1-0-0	4
4	E213C	Metallurgy and Materials Science	3	0-0-0	3
5	E213D	Machine Drawing	2	0-0-3	4
6	E2108	Basic Electrical and Electronics Lab	0	0-3-0	2
7	E2109	Metallurgy Lab	0	0-3-0	2
8	E2110	Mechanics of Solids Lab	0	0-3-0	2
		Total	**16**	**3-9-3**	**24**

II B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E223A	Production Technology	3	0-0-0	3
2	E223B	Kinematics of Machinery	4	1-0-0	4
3	E223C	Applied Thermodynamics – I	4	1-0-0	4
4	E223D	Mechanics of Fluids and Hydraulic Machines	4	1-0-0	4
5	E223E	Instrumentation and Control Systems	3	0-0-0	3
6	E2208	Production technology Lab	0	0-3-0	2
7	E2209	Mechanics of Fluids & Hydraulic Machines Lab	0	0-3-0	2
8	E2210	Instrumentation Lab	0	0-3-0	2
9	E2211	Gender sensitization	0	0-2-0	0
		Total	**18**	**3-11-0**	**24**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist., Telangana-500075

MECHANICAL ENGINEERING

COURSE STRUCTURE – R16

III B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E310A	Management Science for Engineers	4	1-0-0	4
2	E313A	Machine Tools & Metrology	4	1-0-0	4
3	E313B	Dynamics of Machinery	4	1-0-0	4
4	E313C	Design of Machine Members – I	4	1-0-0	4
5		**Open Elective – I**	3	0-0-0	3
6	E3107	Machine Tools Lab	0	0-3-0	2
7	E3108	Metrology Lab	0	0-3-0	2
8	E3109	Employability Skills	0	0-3-0	1
		Total	**19**	**4-9-0**	**24**

III B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E322A	Applied Thermodynamics – II	4	1-0-0	4
2	E322B	Design of Machine Members – II	4	1-0-0	4
3		**Open Elective – II**	3	0-0-0	3
4		**Professional Elective – I**	3	0-0-0	3
5		**Professional Elective – II**	4	0-0-0	4
6	E3207	Fuels and Lubrication & Automobile Engineering. Lab	0	0-3-0	2
7	E3208	Production Drawing Practice	0	0-0-3	2
8	E3209	Thermal Engineering Lab	0	0-3-0	2
		Total	**18**	**2-6-3**	**24**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist., Telangana-500075

MECHANICAL ENGINEERING

COURSE STRUCTURE – R16

IV B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E413A	Heat Transfer	4	1-0-0	4
2	E413B	Finite Element Methods	4	1-0-0	4
3		**Professional Elective – III**	4	0-0-0	4
4		**Professional Elective – IV**	4	0-0-0	4
5		**Professional Elective – V**	4	0-0-0	4
6	E4105	Heat Transfer Lab	0	0-3-0	2
7	E4106	Industry Oriented Mini Project	0	0-3-0	2
		Total	**20**	**2-6-0**	**24**

IV B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E423A	CAD/ CAM	4	1-0-0	4
2		**Open Elective – III**	3	0-0-0	3
3	E4207	CAD/ CAM Lab	0	0-3-0	2
4	E4208	Seminar	0	0-2-0	1
5	E4209	Major Project	0	0-28-0	14
		Total	**7**	**1-33-0**	**24**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lecture, T – Tutorial, P – Practical, D – Drawing, C – Credits.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist., Telangana-500075

MECHANICAL ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – I

Sl. No.	Code	Subject	L	T-P-D	C
1	E322C	Automation in Manufacturing	3	0-0-0	3
2	E322D	Refrigeration and Air-Conditioning	3	0-0-0	3
3	E322E	Un-Conventional Machining Processes	3	0-0-0	3

Professional Elective – II

Sl. No.	Code	Subject	L	T-P-D	C
1	E322F	Power Plant Engineering	4	0-0-0	4
2	E322G	Tribology	4	0-0-0	4
3	E322H	Material Testing	4	0-0-0	4

Professional Elective – III

Sl. No.	Code	Subject	L	T-P-D	C
1	E413C	Robotics	4	0-0-0	4
2	E413D	Design for Manufacturing	4	0-0-0	4
3	E413E	Jet Propulsion and Rocket Engineering	4	0-0-0	4

Professional Elective – IV

Sl. No.	Code	Subject	L	T-P-D	C
1	E413F	Computational Fluid Dynamics	4	0-0-0	4
2	E413G	Mechanical Vibrations	4	0-0-0	4
3	E413H	Production Planning and Control	4	0-0-0	4

Professional Elective – V

Sl. No.	Code	Subject	L	T-P-D	C
1	E413I	Machine Tool Design	4	0-0-0	4
2	E413J	CNC Technologies and Rapid Prototyping	4	0-0-0	4
3	E413K	Plant Layout and Material Handling	4	0-0-0	4

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist , Telangana-500075

COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – I

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E31OC	Disaster Management	Civil Engineering
2	E31OD	Elements of Civil Engineering	Civil Engineering
3	E31OE	Network Analysis and Synthesis	Electrical and Electronics Engineering
4	E31OF	Measurements and Instruments	Electrical and Electronics Engineering
5	E31OG	Automobile Engineering	Mechanical Engineering
6	E31OI	Engineering Materials and Fabrication Processes	Mechanical Engineering
7	E31OJ	Principles of Electronic Communications	Electronics and Communication Engineering
8	E31OK	Matlab Programming	Electronics and Communication Engineering
9	E31OL	Data Structures through C	Computer Science and Engineering
10	E31OM	Python Programming	Computer Science and Engineering
11	E31ON	E-Disaster Management	Information Technology
12	E31OO	Human Computer Interaction	Information Technology
13	E31OP	Introduction to Microprocessors and Microcontrollers	Electronics and Computer Engineering
14	E31OQ	Internet of Things	Electronics and Computer Engineering

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist , Telangana-500075

COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – II

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E32OA	Estimation, Quantity Survey & Valuation	Civil Engineering
2	E32OB	Waste Management	Civil Engineering
3	E32OC	Non-Conventional Energy Sources and Applications	Electrical and Electronics Engineering
4	E32OD	Electrical Technology	Electrical and Electronics Engineering
5	E32OE	Operation Research	Mechanical Engineering
6	E32OG	Nanotechnology	Mechanical Engineering
7	E32OH	Applications of Micro Processors and Controllers	Electronics and Communication Engineering
8	E32OI	Fundamentals of HDL	Electronics and Communication Engineering
9	E32OJ	Database Management Systems	Computer Science Engineering
10	E32OK	Cloud Computing	Computer Science Engineering
11	E32OL	E-Waste Management	Information Technology
12	E32OM	Introduction to Web Design	Information Technology
13	E32ON	Introduction to Embedded systems	Electronics and Computer Engineering
14	E32OO	Fundamentals of E-Commerce	Electronics and Computer Engineering

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist , Telangana-500075

COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – III

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E42OA	Environmental Impact Assessment	Civil Engineering
2	E42OB	Green Building Technology	Civil Engineering
3	E42OC	Materials in Electrical Systems	Electrical and Electronics Engineering
4	E42OD	Field Theory and Circuits	Electrical and Electronics Engineering
5	E42OE	Reliability Engineering	Mechanical Engineering
6	E42OG	Special Manufacturing Processes	Mechanical Engineering
7	E42OH	Principles of Computer Communication and Networks	Electronics and Communication Engineering
8	E42OI	Speech Processing	Electronics and Communication Engineering
9	E42OJ	Soft Computing	Computer Science Engineering
10	E42OK	E-commerce	Computer Science Engineering
11	E42OL	Internet of Things	Information Technology
12	E42OM	Semantic Web and Social Networks	Information Technology
13	E42ON	Fundamentals of Intelligence Systems	Electronics and Computer Engineering
14	E42OO	Introduction to Neural Networks	Electronics and Computer Engineering

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

(E110A) MATHEMATICS- I
Linear Algebra and Differential Equations
(Common to All Branches)

Course Objectives:
The student will

1. Understand the methods of solving the linear differential equations of first and higher order and applications of the differential equations
2. Recognize the types of matrices and their properties and the concept of rank of a matrix and applying the same to understand the consistency
3. Learn how to solve the linear systems and the concepts of Eigen values and Eigen vectors and reducing the quadratic forms into their canonical forms
4. Equipped with the concept of total derivative and finding maxima and minima of functions of two variables
5. Formation of the partial differential equations and solving the first order equations

UNIT–I: Initial Value Problems and Applications-Exact differential equations - Reducible to exact. Linear differential equations of higher order with constant coefficients: Non homogeneous terms with RHS term of the type e^{ax} , sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)-Operator form of the differential equation, finding particular integral using inverse operator, Wronskian of functions, method of variation of parameters. Applications: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories, Electrical circuits.

UNIT–II: Linear Systems of Equations- Types of real matrices and complex matrices, rank, echelon form, normal form, consistency and solution of linear systems (homogeneous and Non-homogeneous) - Gauss elimination, Gauss Jordon and LU decomposition methods- Applications: Finding current in the electrical circuits.

UNIT–III: Eigen values, Eigen Vectors and Quadratic Forms- Eigen values, Eigen vectors and their properties, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem, Diagonalization, Quadratic forms, Reduction of Quadratic forms into their canonical form, rank and nature of the Quadratic forms – Index and signature.

UNIT–IV: Partial Differentiation- Introduction of partial differentiation, homogeneous function, Euler's theorem, total derivative, Chain rule, Taylor's and Mclaurin's series

expansion of functions of two variables, functional dependence, Jacobian. Applications: maxima and minima of functions of two variables without constraints and Lagrange's method (with constraints)

UNIT -V: First Order Partial Differential Equations- Formation of partial differential equations by elimination of arbitrary constants and arbitrary Functions, Lagrange's method to solve the first order linear equations and the standard type methods to solve the non-linear equations.

TEXT BOOKS:

1. A first course in differential equations with modeling applications by Dennis G. Zil Cengage Learning publishers.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.

REFERENCES:

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons Publisher.
2. Engineering Mathematics by N. P. Bali, Lakshmi Publications.

Course Outcomes:

The student will be able to

1. Solve higher order DE's and apply them for solving some real world problems
2. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
3. Analyze the Eigen values and Eigen vectors which come across under linear transformations
4. Examine the values of functions of two variables with/ without constraints.
5. Solve linear partial differential equations of first order

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**4**	**1-0-0**	**4**

(E110G) MATHEMATICS- II
Advanced Calculus
(Common to ME, CE & MIE)

Course Objectives:
The Student will

1. Understand the concepts & properties of Laplace transforms and solving differential equations using Laplace transform techniques.
2. Examine the evaluation of integrals using beta and gamma functions.
3. Describe multiple integrals and applying them to compute the volume and areas of regions and the physical quantities involved in engineering field related to the vector valued functions.
4. Evaluate the basic properties of vector valued functions and their applications.
5. Describe the Vector integral theorems on line, surface and volume integrals

UNIT – I: Laplace Transforms: Laplace transforms of standard functions, Shifting theorems, derivatives and integrals, properties- UNIT step function, Dirac's delta function, Periodic function, Inverse Laplace transforms, Convolution theorem (without proof) Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT – II: Beta and Gamma Functions: Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions. Applications: Evaluation of integrals.

UNIT – III: Multiple Integrals: Double and triple integrals, Change of variables, Change of order of integration. Applications: Finding areas, volumes& Center of gravity (evaluation using Beta and Gamma functions).

UNIT – IV: Vector Differentiation: Scalar and vector point functions, Gradient, Divergence, Curl and their physical and geometrical interpretation, Laplacian operator, Vector identities

UNIT – V: Vector Integration: Line Integral, Work done, Potential function, area, surface and volume integrals, Vector integral theorems: Greens, Stokes and Gauss divergence theorems (without proof) and related problems.

TEXT BOOKS:

1. Advanced Engineering Mathematics by R K Jain & S R K Iyengar, Narosa Publishers
2. Engineering Mathematics by Srimanthapal and Subodh C. Bhunia, Oxford Publishers

Course Outcomes:

The student will be able to

1. Use Laplace transforms techniques for solving differential equations.
2. Evaluate integrals using beta and gamma functions.
3. Evaluate the multiple integrals and can apply these concepts to find areas, volumes, moment of inertia etc. of regions on a plane or in space.
4. Calculate the UNIT tangent vector, the UNIT normal vector and the UNIT bi-normal vector at a point on a space curve described by a vector-valued position function.
5. Analyze the line, surface and volume integrals and converting them from one to another.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

(E110H) ENGINEERING PHYSICS

(Common to ME, CE & MIE)

Course Objectives:

The Student will

1. The understand interaction of light with matter through interference, diffraction and polarization.
2. The Distinguish between ordinary light with a laser light and to realize propagation of light through optical fibers.
3. Various crystal systems and their structures elaborately.
4. Various crystal imperfections and probing methods like X-RD.
5. The concepts of latest developments in fiber optics

UNIT – I: Interference: Coherence, division of amplitude and division of wave front, interference in thin films (transmitted and reflected light), Newton's rings experiment. **Diffraction:** Distinction between Fresnel and Fraunh offer diffraction, diffraction due to single slit, N-slits, Diffraction grating experiment.

UNIT – II: Polarization: Introduction, Malus's law, double refraction, Nicol prism, Quarter wave and half wave plates.

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein coefficients, population inversion, ruby laser, helium – neon laser, semiconductor laser, applications of lasers

UNIT – III: Fiber Optics: Principle of optical fiber, construction of fiber, acceptance angle and acceptance cone, numerical aperture, types of optical fibers: step index and graded index fibers, attenuation in optical fibers, applications of optical fibers in medicine and sensors

UNIT – IV: Crystallography: Space lattice, UNIT cell and lattice parameters, crystal systems, Bravais lattices, atomic radius, co-ordination number and packing factor of SC, BCC, FCC, HCP and diamond, Miller indices, crystal planes and directions, inter planar spacing of orthogonal crystal systems

UNIT – V: **X-ray Diffraction and Defects in Crystals:** Bragg's law, X-ray diffraction methods: Laue method, powder method; point defects: vacancies, substitutional, interstitial, Frenkel and Schottky defects, line defects (qualitative) and Burger's vector, surface defects: stacking faults, twin, tilt and grain boundaries.

TEXT BOOKS

1. Physics Vol. 2, Halliday, Resnick and Kramer John wiley and Sons, Edition 4.
2. Modern Engineering Physics, K. Vijaya Kumar and S. Chandra Lingam, S. Chand and Co. Pvt. Ltd.

REFERENCE BOOKS

1. Introduction to Solid State Physics, Charles Kittel, Wiley Student edition.
2. X-Ray Crystallography, Phillips, John Wiley publishers.
3. Waves, Frank S Crawford Jr, Berkeley Physics course, Volume 3.

Course outcomes:

The student will be able to

1. Realize the importance of light phenomena in thin films and resolution.
2. Know principle, working of various laser systems and light propagation through optical fibers.
3. Distinguish between various crystal systems.
4. Identify the crystal defects by using X-RD.
5. Get familiarized with the latest developments and applications like Fiber optics.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

(E115A) COMPUTER PROGRAMMING IN C

(Common to ME, CE & MIE)

Course Objectives:

The student will

1. Understand the fundamentals of computers.
2. Reads the fundamentals of c programming such as variables, constants, basic data types, selection statements, repetition statements etc.
3. Studies the need for user-defined functions and understand the concept of arrays and its memory organization
4. Reads the significance of pointers and describe about various character and string functions.
5. Understand the concept of structures and unions.

UNIT – I: Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development, algorithms and flowcharts, Number systems -Binary, Decimal, Hexadecimal and Conversions, storing integers and real numbers.

Introduction to C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators (Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements(making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

UNIT - II: Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Limitations of recursion, example C programs.

Arrays – Concepts, using arrays in C, inter function communication, array applications-linear search, binary search and bubble sort, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT - III: Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT - IV: Enumerated, Structure, and Union Types– The Type Definition (type def), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command–line arguments, Preprocessor commands.

UNIT - V: Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling).

TEXT BOOKS

1. Computer Science: A Structured Programming Approach Using C, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh, Second Edition, Oxford University Press

REFERENCE BOOKS

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, Second Edition, Pearson education.
2. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, McGraw Hill Education (India) Pvt Ltd.
3. C from Theory to Practice, G S. Tselikis and N D. Tselikas, CRC Press

Course Outcomes:

The student will be able to

1. Demonstrate the basic knowledge of computer hardware and software.
2. Write effective programs using c programming language.
3. Choose between different argument passing mechanisms and use multi dimensional arrays.
4. Use pointers with arrays and apply various character and string functions.
5. Choose between structures and unions.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

(E113A) ENGINEERING MECHANICS

(Common to all Branches)

Course Objectives:

The student will

1. Read the concept of system of forces and its applications.
2. Determine the centroid and Centre of Gravity of different structures
3. Understand the concept of inertia and its real time applications
4. Analyze the bodies in motion

UNIT - I: Introduction to Engineering Mechanics

Basic Concepts. Systems of Forces: Coplanar Concurrent Forces–Forces in Space–Moment of Force and its Application–Couples and Resultant of Force Systems.

Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems -Equilibrium of Spatial Systems.

UNIT - II: Centroid

Centroids of simple figures (from basic principles) – Centroids of Composite Figures.

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorem.

UNIT – III: Area moment of Inertia

Definition–Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

UNIT - IV: Kinematics

Rectilinear and Curvilinear motions–Velocity and Acceleration–Motion of Rigid Body Types and their Analysis in Planar Motion.

UNIT - V: Kinetics

Analysis as a Particle and Analysis as a Rigid Body in Translation–Central Force Motion Equations of Plane Motion–Fixed Axis Rotation–Rolling Bodies.

TEXT BOOKS

1. Engineering. Mechanics / Timoshenko & Young.
2. Engineering Mechanics, Basudev Bhattacharya, Oxford Univ. Press, New Delhi, Second Edition, 2014.

REFERENCE BOOKS

1. Engineering Mechanics / Fedinand. L. Singer / Harper–Collins
2. Engineering Mechanics / S.S. Bhavikatti & J.G. Rajasekharappa
3. Engineering Mechanics / Irving. H. Shames Prentice–Hall.

Course outcomes:

The student will be able to

1. Recognize the resultant of a force system acting on an object.
2. Identify the surface area of complex objects.
3. Relate with application of different theorems of Moment of Inertia.
4. Identify the kinematics involved in a moving object.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**2**	**0-0-4**	**4**

(E113B) ENGINEERING GRAPHICS

(Common to ME, CE & MIE)

Course Objectives:

The student will

1. Get the basic knowledge of conventions used in engineering graphics, constructing engineering scales and various methods to construct various engineering curves.
2. Identify the different angles of projections, conventions and the position of objects in various planes.
3. Understand the different orientations of two dimensional planes and right regular solids at different inclinations with respect to projection planes able to identify the internal features of object.
4. Define the size and shape of required sheet to form a right regular solid.
5. Learn to solve the typical problems from 3-Dimensional view to simplified 2-Dimensional view and vice versa.

UNIT - I: Introduction to Engineering Drawing

Principles of Engineering Drawing and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Scales: Different types of Scales, Plain scales, Vernier Scale, Diagonal Scale, Scales of chords.

Construction of Curves Used In Engineering Practice:

a) Conic Sections; Ellipse-General, Concentric Circle, Arcs of circle and Oblong Method, Parabola – General, Tangent and Rectangular Methods, Hyperbola – General, Point / Rectangle Method.
b) Cycloid, Epicycloid and Hypocycloid
c) Involute for Circle, Rectangle and Triangle

UNIT - II: Projections of Points and Lines

Principles of Orthographic Projections–Conventions– First and Third Angle, Projections of Points and Lines inclined to planes, True lengths, Traces.

UNIT – III: Projections of Planes

Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes.

Projections of Solids: Projections of Regular Solids inclined to both planes, Section of right regular solids -Prism, Cylinder, Pyramid and Cone.

UNIT - IV: Development of Surfaces

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

UNIT - V: Isometric Projections

Principles of Isometric Projection–Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

Orthographic Projections: Conversion of Isometric Views to Orthographic Views– Conventions.

TEXT BOOKS

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering Drawing and Graphics, Venugopal / New age.
3. Engineering Drawing – Basant Agrawal, TMH

REFERENCE BOOKS

1. Engineering drawing – P.J. Shah.S.Chand.
2. Engineering Drawing, Narayana and Kannaiah / Scitech publishers.
3. Engineering Drawing- Johle/Tata Macgraw Hill.
4. Computer Aided Engineering Drawing- Trymbaka Murthy- I.K. International.

Course Outcomes:

The student will be able to

1. Construct various scales and can draw the objects of various sizes in a prescribe given size of sheet. And able obtain various curves used in engineering design.
2. Obtain the projections of point and line in different positions and different inclinations respectively. Construct Traces of lines.
3. Obtain the projections of plane and solid with different positions of surfaces edges and axis with respect to reference planes.
4. Can be able to draw the sectional views to view inside features of right regular syllabus.
5. Able to identify the objects of complicated shape and to draw the same in 2-Dimensional view. Can draw 3-Diemensional views and isometric projections by observing front view and top view (2-Dimensional views).

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

(E1103) ENGINEERING PHYSICS LAB

(Common to ME, CE &MIE)

Course Objective: The student will

1. Works with uses of torsional pendulum
2. Examine energy gap of semiconductors
3. Analyze the behavior and characteristics of various materials for its optimum utilization.
4. Practice about the various electronic communication mechanisms and their usage in a practical manner.

Cycle-I

EXPERIMENT 1: Dispersive power of the material of a prism – Spectrometer.

EXPERIMENT 2: Torsional pendulum – Rigidity modulus.

EXPERIMENT 3: Newton's Rings – Radius of curvature of Plano convex lens.

EXPERIMENT 4: Melde's experiment – Transverse and longitudinal modes.

EXPERIMENT 5: Charging, discharging and time constant of an R-C circuit.

EXPERIMENT 6: L-C-R circuit – Resonance & Q-factor.

Cycle-II

EXPERIMENT 1: Magnetic field along the axis of current carrying coil – Stewart and Gees method and to verify Biot – Savart's law.

EXPERIMENT 2: Study the characteristics of LED and LASER diode.

EXPERIMENT 3: Bending losses of fibres & Evaluation of numerical aperture of a given fibre.

EXPERIMENT 4: Energy gap of a material of p-n junction.

EXPERIMENT 5: Determination of wavelengths of white source – Diffraction grating

EXPERIMENT 6: Wavelength of light, resolving power and dispersive power of a diffraction grating using laser.

EXPERIMENT 7: Dielectric constant of a material / V-I characteristics of a solar cell.

Course Outcomes: The student will be able to

1. Sketch the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.
2. Identify the characteristics and the behavior of various materials in a practical manner and gain knowledge about various communication mediums and its usage.
3. Implement various experimental skills which is very essential for an Engineering student
4. Employ to various tools like Screw gauge, Vernier Calipers, Physical Balance, Spectrometer and Microscope

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

(E1104) COMPUTER PROGRAMMING IN C LAB

(Common to ME, CE & MIE)

Course Objective:

The student will

1. Implement linked list, stack, queue, tree
2. Develop programming skills using the fundamentals and basics of C language
3. Change character strings in C programs.
4. Use pointers to efficiently solve problems
5. Memorize functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions.

EXPERIMENT 1:

a) Write a C program to find the factorial of a positive integer.

b) Write a C program to find the roots of a quadratic equation.

EXPERIMENT 2:

a) Write a C program to determine if the given number is a prime number or not.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence

EXPERIMENT 3:

a) Write a C program to construct a pyramid of numbers.

b) Write a C program to calculate the following Sum: Sum=1-x^2/2! +x^4/4!-x^6/6!+^{x8}/8!-x^{10}/10!

EXPERIMENT 4:

a) The least common multiple (lcm) of two positive integers a and b is the smallest integer that is evenly divisible by both a and b. Write a C program that reads two integers and calls lcm (a, b) function that takes two integer arguments and returns their lcm. The lcm (a, b) function should calculate the least common multiple by calling the gcd (a, b) function and using the following relation: LCM (a,b) = ab / gcd (a,b)

b) Write a C program that reads two integers n and r to compute the ncr value using the following relation: ncr (n,r) = n! / r! (n-r)! . Use a function for computing the factorial value of an integer.

EXPERIMENT 5:

a) Write C program that reads two integers x and n and calls a recursive functionto compute xn

b) Write a C program that uses a recursive function to solve the Towers of Hanoi problem.

c) Write a C program that reads two integers and calls a recursive function to compute ncr value.

EXPERIMENT 6:

a) Write a C program to generate all the prime numbers between 1 and n, where nis a value supplied by the user using Sieve of Eratosthenes algorithm.

b) Write a C program that uses non recursive function to search for a Key

i. Value in a given list of integers. Use linear search method.

EXPERIMENT 7:

a) Write a menu-driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b) Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers. Use binary search method.

EXPERIMENT 8:

a) Write a C program that implements the Bubble sort method to sort a given listof integers in ascending order.

b) Write a C program that reads two matrices and uses functions to performthe following:

i) Addition of two matrices

ii) Multiplication of two matrices

EXPERIMENT 9:

a) Write a C program that uses functions to perform the following operations:

i) to insert a sub-string into a given main string from a given position.

ii) to delete n characters from a given position in a given string.

b) Write a C program that uses a non-recursive function to determine if the given string is a Palindrome or not.

EXPERIMENT 10:

a) Write a C program to replace a substring with another in a given line of text.

b) Write a C program that reads 15 names each of up to 30 characters, stores them in an array, and uses an array of pointers to display them in ascending (i.e. alphabetical) order.

EXPERIMENT 11:

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to convert a positive integer to a roman numeral. Ex. 11 is converted to XI.

EXPERIMENT 12:

a) Write a C program to display the contents of a file to standard output device.

b) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.

EXPERIMENT 13:

a) Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

b) Write a C program to compare two files, printing the first line where they differ.

EXPERIMENT 14.

a) Write a C program to change the nth character (byte) in a text file. Use fseek function.

b) Write a C program to reverse the first n characters in a file. The file name and n are specified on the command line. Use fseek function.

EXPERIMENT 15.

a) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

b) Define a macro that finds the maximum of two numbers. Write a C program that uses the macro and prints the maximum of two numbers.

Reference Books:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C++: The complete reference, H. Schildt, TMH Publishers.

Course Outcomes

The student will be able to

1. Write, compile and debug programs using different programming constructs in C language.
2. Design programs using modular structures
3. Apply and practice logical ability to solve the problems using C
4. Design and present the algorithms flow charts and programs
5. Perform operations like searching, insertion, deletion, traversing mechanism etc.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - I Semester	**2**	**0-0-0**	**0**

(E110E) ENVIRONMENTAL STUDIES

(Common to CSE,ME,MIE& IT)

Course Objectives:

The student will

1. Discover about the different natural resources available and how to use them.
2. Reads about biodiversity.
3. Reads about environmental impact assessment and management.
4. Studies about the global environmental problems.
5. Studies about sustainability

UNIT - I: Ecosystems, Natural Resources & **Biodiversity**

Concept, Classification of Resources: Water resources, Land resources, Forest resources, Mineral resources, Energy resources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, levels, hotspots, values of biodiversity, threats to biodiversity, conservation of biodiversity.

UNIT - II: Global Environmental Problems and Global Efforts

Deforestation Greenhouse effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

Environmental Impact Assessment (Eia) and Environmental Management Plan:

Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP)

UNIT – III: Environmental Policy, Legislation, Rules and Regulations & Towards Sustainable Future

Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

TEXT BOOKS

1. Text Book of Environmental Science and Technology by M.Anji Reddy2007
2. Principles of Environmental Science and Engineering by P.Venugopal Rao
3. Introduction to Environmental Studies by K. Mukkanti
4. Text book of Environmental Studies by Kaushik & Anubha Kaushik.

REFERENCE BOOKS

1. Tata McGraw Hill: Introduction to Environmental Studies by Benny Joseph
2. Environmental studies by ErachBharucha 2005, University Grants Commission, University Press

Course Outcomes:

The student will be able to

1. Identify the importance of natural resources and use them efficiently.
2. Support and conserve the biodiversity.
3. Apply environmental plan in developing any sort of environmental projects.
4. Solve the sources and risks caused by pollution.
5. Apply the environmental legislation in every walk of life and importance of sustainability

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

(E120D) APPLIED PHYSICS

(Common to ME,CE & MIE)

Course Objectives:

The student will

1. Understand magnetic, dielectric and superconducting properties
2. Understand the elastic behavior of materials.
3. Understand basic principles of acoustics and architecture of buildings.
4. Understand magnetic, dielectric and superconducting properties.
5. Study different materials and differentiate the properties**.**

UNIT - I: Elastic properties: stress and strain, Hooke's law, elastic behavior of a material, factors affecting elasticity, three moduli of elasticity, work done for UNIT volume in deforming a body, relation between three moduli of elasticity, determination of rigidity modulus – torsional pendulum.

UNIT - II: Acoustics of buildings and acoustic quieting: Introduction, basic requirement for the acoustically good halls, reverberation and time of reverberation, transmission of sound and transmission loss, factors affecting the architectural acoustics and their remedy, sound absorbing materials, sabine formulae, absorption coefficients, stadium seating, movie theater, acoustic quieting.

UNIT – III: Ultrasonics

Introduction, production of ultrasonic waves, magnetostriction method, piezo electric method, detection of ultrasonic waves, properties of ultrasonic waves, use of ultrasonics for nondestructive testing, applications of ultrasonics.

UNIT - IV: Dielectric Properties

Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic, ionic and orientation polarizations and calculation of their polarizabilitites, internal field, Clausius - Mossotti relation, Piezoelectricity, pyroelectricity and ferroelectricity - $BaTiO_3$ structure.

UNIT - V: Magnetic Properties

Permeability, field intensity, magnetic field induction, magnetization, magnetic susceptibility, origin of magnetic moment, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, hysteresis curve based on domain theory, soft and hard magnetic materials, properties of anti - ferro and ferrimagnetic materials.

Superconductivity: Superconductivity phenomenon, Meissner effect, applications of superconductivity.

TEXT BOOKS

1. Solid State Physics, A. J. Dekkar, MacMillan publishers
2. Fundamentals of Physics, Alan Giambattisa, BM Richardson and Robert C Richardson, Tata McGraw hill Publishers
3. Fundamentals of Acoustics, Kinster and Frey, John Wiley and Sons.

REFERENCE BOOKS

1. Solid state physics, Charles Kittel, Wiley student edition
2. University Physics, Francis W. Sears, Hugh D. Young, MarleZeemansky and Roger A Freedman, Pearson Education.
3. Introduction to Magnetic Materials, B.D. Cullity, C. D. Graham, A John Wiley & Sons, Inc., Publication.
4. Elastic and Inelastic Stress Analysis, Irving H. Shames, Francis A. Cozzarelli, Taylor, &Francis Group.

Course Outcomes:

The student will be able to

1. Realize the importance of elastic behavior of materials.
2. Learn Sabine's formula for reverberation time and apply in architecture of buildings.
3. Learn various methods of producing ultrasonic and their uses
4. Learn about the sound absorptions of different materials.
5. Know about various methods to fabricate the different materials

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**0-0-0**	**4**

(E120G) ENGINEERING CHEMISTRY

(Common to ME, CE &MIE)

Course Objectives:

The Student will

1. Acquire the skills to critically assess and solve problems related to water requiring the application of chemical principles.
2. Be made familiar with research design methodology and to use problem-solving techniques associated with electrochemistry.
3. Understand to organize and present chemical information coherently through oral and written discourse based on polymers.
4. Learn how be to apply science and engineering in the analysis and evaluation of process involved in production of energy efficient fuels.
5. Be equipped with the ability to invent or discover new environmental friendly, energy efficient and economically effective engineering materials in a sustainable manner.

UNIT - I: Water and its treatment

Introduction–hardness of water–causes of hardness–types of hardness: temporary and permanent – expression and UNITs of hardness – Estimation of hardness of water by complexometric method. Numerical problems. Potable water and its specifications- Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and Ozonization. Defluoridation – Nalgonda technique - Determination of F^- ion by ion-selective electrode method.

Boiler troubles: Sludges, scales and Caustic embrittlement. Internal treatment of Boiler feed water (Calgon conditioning – Phosphate conditioning - Colloidal conditioning) Softening of water by ion-exchange processes. Desalination of water – Electro-dialysis & Reverse osmosis. Numerical problems.

UNIT - II: Electrochemistry and Batteries:

Electrochemistry: Electrode- electrode potential, standard electrode potential, types of electrodes – Construction and functioning of Standard hydrogen electrode, calomel, Quinhydrone and glass electrode. Nernst equation - electrochemical series and its applications. Electrochemical cells: Daniel cell – cell notation, cell reaction and cell emf – Potentiometric titrations and Applications- Determination of pH and EMF. Concept of concentration cells-electrolyte concentration cell. Numerical problems.

Batteries: Cell and battery - Primary battery (dry cell, alkaline cell and Lithium cell) and Secondary battery (lead acid, Ni-Cd and lithium ion cell),

Fuel cells: Hydrogen –oxygen, phosphoric acid and methanol-oxygen fuel cells – Applications.

UNIT – III: Polymers

Definition–Classification of polymers with examples–Types of polymerization–addition and condensation polymerization with examples.

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding) Preparation, Properties and engineering applications of PVC and Bakelite.

Fibers: Characteristics of fibers–preparation, properties and applications of Nylon-6, 6 and Dacron. Kevlar- Liquid crystal polymers-Applications.

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics–preparation–properties and applications of Buna-S, Butyl and Thiokol rubber.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Fuels and Combustion

Classification- solid fuels: coal–analysis of coal–proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol-Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG.

Combustion: Definition, Calorific value of fuel–HCV, LCV-Dulongs Formula; Calculation of air quantity required for combustion of a fuel.

UNIT - V: Engineering Materials and applications:

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants–mechanism of lubrication-properties of lubricants.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-poly acetylene and applications of conducting polymers.

Nanomaterials: Introduction, Preparation-Top down & bottom up process-sol gel method and self assembly process. Applications of nano materials.

Composites: Introduction- Constituents of composites–advantages, classification and constituents of composites. Fiber reinforced plastics (FRP). Applications of composites.

TEXT BOOKS

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, New Delhi
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, New Delhi
3. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi

REFERENCE BOOKS

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi
2. Engineering Chemistry by Thirumala Chary and Laxminarayana, Scitech Publishers, Chennai
3. Engineering Chemistry by Andhra Naidu. B.S Publications.
4. Chemistry of Engineering Materials by CV Agarwal,C.P. Murthy, A.Naidu, BS Publications.

Course Outcomes:

The student will be able to

1. Asses and solve problems requiring the application of chemical principles.
2. Use problem solving techniques associated with research design methodology.
3. Present chemical information through oral and written discourse and evaluate engineering components and systems based on polymers.
4. Produce new innovative methods and engineering materials that are useful in every walk of life.
5. Develop and apply new chemical techniques for the production of engineering materials that are useful in every walk of life.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

(E120C) MATHEMATICS - III

STATISTICAL AND NUMERICAL METHODS

(Common to All Branches)

Course Objectives:

The Student will

1. Understand random variables that describe randomness or an uncertainty in certain realistic situation and binomial geometric and normal distributions.
2. Formulate sampling distribution of mean, variance, point estimation and interval estimation and the testing of hypothesis and ANOVA.
3. Describe the topics that deal with methods to find roots of an equation.
4. Discuss how to fit a desired curve by the method of least squares for the given data.
5. Identify how to solve ordinary differential equations using numerical techniques.

UNIT - I: Random variables and Distributions:

Introduction, Random variables, Discrete random variable, Continuous random variable, Probability, distribution function, Probability density function, Expectation, Moment generating function, Moments and properties. Discrete distributions: Binomial and geometric distributions. Continuous distribution: Normal distributions.

UNIT - II: Sampling Theory

Introduction, Population and samples, Sampling distribution of means (σ Known)-Central limit theorem, t-distribution, Sampling distribution of means (σ unknown)-Sampling distribution of variances – χ^2 and F- distributions, Point Estimation, Maximum error of estimate, Interval estimation.

UNIT – III: Tests of Hypothesis

Introduction, Hypothesis, Null and Alternative Hypothesis, Type I and Type II errors, Level of significance, One tail and two-tail tests, Tests concerning one mean and proportion, two means -proportions and their differences-ANOVA for one-way classified data and their applications.

UNIT - IV: Algebraic and Transcendental Equations & Curve Fitting

Introduction, Bisection Method, Method of False position, Iteration methods: fixed point iteration and Newton Raphson methods. Solving linear system of equations by Gauss-Jacobi and Gauss - Seidal Methods.

Curve Fitting: Fitting a linear, second degree, exponential, power curve by method of least squares.

UNIT - V: Numerical Integration and solution of Ordinary Differential equations
Trapezoidal rule-Simpson's 1/3rd and 3/8th rule- Solution of ordinary differential equations by Taylor's series,
Picard's method of successive approximations, Euler's method, Runge - Kutta method (2 & 4^{th} order)

TEXT BOOKS

1. Probability and Statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E. Freund, New Delhi, Prentice Hall.
2. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning.
3. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R. K**.** Iyengar and R. K. Jain, New Age International Publishers

REFERENCE BOOKS

1. Fundamentals of Mathematical Statistics by S. C. Guptha & V. K. Kapoor, S. Chand.
2. Introductory Methods of Numerical Analysis by S. S. Sastry, PHI Learning Pvt. Ltd.
3. Mathematics for engineers and scientists by Alan Jeffrey, 6th edition, CRC press.

Course Outcomes:

The student will be able to

1. Differentiate among random variables involved in the probability models which are useful for all branches of engineering.
2. Evaluate mean, proportions and variances of sampling distributions and to make important decisions for few samples which are taken from a large data.
3. Solve the tests of ANOVA for classified data.
4. Identify the root of a given equation and solution of a system of equations &design a curve for a given data.
5. Identify the numerical solutions for a given first order initial value problem.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

(E120H) PROFESSIONAL COMMUNICATION INENGLISH

(Common to ME, CE &MIE)

Course Objectives:

The student will

1. Understand the speech of Dr. APJ Abdul Kalam.
2. Know how Satya Nadella succeeded in his life.
3. Learn the concept of technical communication.
4. Learn how to behave with everyone.
5. Know the influence of parents in their life.

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic and communicative competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text book for detailed study. The students should be encouraged to read the texts/poems silently leading to reading comprehension. Reading comprehension passages are given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, from newspaper articles, advertisements, promotional material, etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills.*

SYLLABUS

Reading Skills:

Objectives:

1. To develop an awareness in students about the significance of silent reading and comprehension.
2. To develop students' ability to guess meanings of words from the context and grasp the overall message of the text, draw inferences, etc., by way of:
3. Skimming and Scanning the text
4. Intensive and Extensive Reading
5. Reading for Pleasure
6. Identifying the topic sentence

NOTE: The students will be trained in reading skills using the prescribed texts for detailed study. They will be tested in reading comprehension of different 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives:

1. To develop an awareness in the students about writing as an exact and formal skill
2. To create an awareness in students about the components of different forms of writing, beginning with the lower order ones through;
3. Writing of sentences
4. Use of appropriate vocabulary
5. Paragraph writing
6. Coherence and cohesiveness
7. Narration / description
8. Note Making
9. Formal and informal letter writing
10. Describing graphs using expressions of comparison

In order to improve the proficiency of the students in the acquisition of language skills mentioned above, the following text and course contents, divided into Five UNITs, are prescribed:

UNIT - I:

Chapter entitled '***Presidential Address*" *by Dr. A.P.J. Kalam*** from ***"Fluency in English–A Course book for Engineering Students"*** published by Orient Black Swan, Hyderabad.

Vocabulary: Word Formation -- Root Words --The Use of Prefixes and Suffixes– Collocations– Exercises for Practice.

Grammar: Punctuation – Parts of Speech- Articles -Exercises for Practice.

Reading: ***Double Angels*** by David Scott-Reading and Its Importance- Techniques for Effective Reading- Signal Words- Exercises for Practice

Writing: Writing Sentences- Techniques for Effective Writing-- Paragraph Writing-Types, Structure and Features of a Paragraph-Coherence and Cohesiveness: Logical, Lexical and Grammatical Devices - Exercises for Practice

UNIT - II:

Chapter entitled ***Satya Nadella: Email to Employees on his First Day as CEO*** from ***"Fluency in English– A Course book for Engineering Students"*** Published by Orient Black Swan,

Hyderabad.

Vocabulary: Synonyms and Antonyms–Homonyms, Homophones, Homographs-Exercises for Practice (Chapter 17 ***'Technical Communication- Principles and Practice*".**

Third Edition published by Oxford University Press may also be followed.)

Grammar: Verbs-Transitive, Intransitive and Non-finite Verbs–Moodand Tense— Gerund – Words with Appropriate Prepositions – Phrasal Verbs - Exercises for Practice

Reading: Sub-skills of Reading- Skimming, Scanning, Extensive Reading and Intensive Reading - ***The Road Not Taken*** by **Robert Frost** -- Exercises for Practice

Writing: Letter Writing–Format, Styles, Parts, Language to be used in Formal Letters- Letter of Apology – Letter of Complaint-Letter of Inquiry with Reply – Letter of Requisition –- Exercises for Practice

UNIT – III:

From the book entitled ***'Technical Communication-Principles and Practice". Third Edition*** published by Oxford University Press.

Vocabulary: Introduction- A Brief History of Words–Using the Dictionary and Thesaurus– Changing Words from One Form to Another – Confusables (From Chapter 17 entitled '*Grammar and Vocabulary Development*')

Grammar: Tenses: Present Tense- Past Tense- Future Tense- Active Voice–Passive Voice- Conditional Sentences – Adjective and Degrees of Comparison. (From Chapter 17 entitled '*Grammar and Vocabulary Development*')

Reading: Improving Comprehension Skills–Techniques for Good Comprehension- Skimming and Scanning- Non-verbal Signals – Structure of the Text – Structure of Paragraphs – Punctuation – Author's viewpoint (Inference) – Reader Anticipation: Determining the Meaning of Words – Summarizing- Typical Reading Comprehension Questions. (From Chapter 10 entitled '*Reading Comprehension*')

Writing: Introduction- Letter Writing-Writing the Cover Letter- Cover Letters Accompanying Resumes- Emails. (From Chapter 15 entitled '*Formal Letters, Memos, and Email'*).

UNIT - IV:

Chapter entitled ***'Good Manners" by J.C. Hill*** from ***Fluency in English–A Course book for Engineering Students"*** published by Orient Black swan, Hyderabad.

Vocabulary: Idiomatic Expressions–One- word Substitutes --- Exercises for Practice (Chapter 17 ***'Technical Communication-Principles and Practice". Third Edition*** published by Oxford University Press may also be followed.)

Grammar: Sequence of Tenses- Concord (Subject in Agreement with the Verb)–Exercises for Practice

Reading: ***„If "*** poem by **Rudyard Kipling**--Tips for Writing a Review ---Author's Viewpoint – Reader's Anticipation-- Herein the Students will be required to Read and Submit a Review of a Book (Literary or Non-literary) of their choice– Exercises for Practice.

Writing: Information Transfer-Bar Charts-Flow Charts-Tree Diagrams etc., -- Exercises for Practice. Introduction - Steps to Effective Precis Writing – Guidelines- Samples (Chapter 12 entitled '*The Art of Condensation*' from ***Technical Communication-Principles and Practice. Third Edition*** published by Oxford University Press)

UNIT - V:

Chapter entitled ***„Father Dear Father "*by Raj Kinger** from ***Fluency in English–A Course book for Engineering Students"*** Published by Orient Black Swan, Hyderabad

Vocabulary: Foreign Words—Words borrowed from other Languages- Exercises for Practice

Grammar: Direct and Indirect Speech- Question Tags- Exercises for Practice

Reading: Predicting the Content- Understanding the Gist–SQ3R Reading Technique- Study Skills – Note Making - Understanding Discourse Coherence – Sequencing Sentences. (From Chapter 10 entitled **'Reading Comprehension'-*Technical Communication- Principles and Practice. Third Edition*** published by Oxford University Press.)

Writing: Technical Reports- Introduction–Characteristics of a Report–Categories of Reports –Formats- Prewriting – Structure of Reports (Manuscript Format) -

Types of Reports - Writing the Report. (From Chapter 13 entitled **'Technical Reports' - *Technical Communication- Principles and Practice. Third Edition*** published by Oxford University Press.)

TEXT BOOKS

1. ***"Fluency in English – A Course book for Engineering Students"*** by Board of Editors**: Hyderabad: Orient Black Swan Pvt. Ltd. 2016. Print.** Raman, Meenakshi and Sharma, Sangeeta***. "Technical Communication-Principles and Practice".* Third Edition. New Delhi: Oxford University Press. 2015. Print.**

REFERENCE BOOKS

1. Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)
2. Rizvi, M. Ashraf. Effective Technical Communication. Tata Mc Graw –Hill. 2015 (Print).

Course Outcomes:

The student will be able to

1. Identify him and try to develop the nation.
2. Implement how to dedicate themselves for the development of their organization and career.
3. Make use of technical vocabulary properly,
4. Follow good manners in their life.
5. Make the parents to realize their over consciousness of their wards.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**0-0-0**	**4**

(E122A) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to ME, CE &MIE)

Course Objectives:

The student will

1. Describe Electric Circuits.
2. Acquire knowledge the given circuit with various theorems and methods.
3. Learn in recognizing of basic electronic devices such as Diodes, Transistors, to build circuits like amplifiers and oscillators etc.
4. Acquire knowledge on the various parameters useful for designing electronic system.
5. Acquire the knowledge of various configurations, characteristics and applications.

UNIT - I: Electrical circuits:

R-L-C Parameters, voltage and current, Independent and Dependent Sources, Source Transformation-V-I relationship for passive elements, Kirchhoff's Laws, Network reduction techniques-series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis.

Single Phase AC Circuits: R.M.S. and Average values, Form Factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance –phase and phase difference, concept of power factor, phasor notation, complex and polar forms of representation.

UNIT - II: Resonance:

Series and parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for various parameters.

Network Theorems: Thevenin's, Norton's, Maximum power Transfer, Superposition, Reciprocity, Tellegen's, Milliman's and Compensation theorems for DC and AC excitations.

UNIT – III: P-N Junction Diode:

P-N junction as a Diode, Symbol, Diode equation, volt-Ampere characteristics, Temperature dependence, Ideal versus practical Diode, static and dynamic resistances, Diffusion and Transition Capacitances.

Rectifiers and Filters: Diode rectifier: Half wave Rectifier, Ripple Factor-Full Wave Rectifier, Bridge Rectifier, Rectifiers with Filters: Inductive Filters, Capacitive Filters, L-section Filters, π- section Filters.

UNIT - IV: Bipolar Junction Transistor (BJT):

Symbol, Construction, principle of Operation, Current Components in a junction transistor Common Emitter, Common Base and Common Collector configurations.

Transistor Biasing -Operating point, DC and AC load lines, Fixed Bias, Collector to Base bias, Self-Bias(Voltage divider bias), Bias stability, Stabilization against variations in VBE, β, and $I_{co.}$

Small signal Transistor Analysis, h- Parameters, Definitions, Determination of h-parameters from CE transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters and their Comparison.

UNIT - V: Junction Field Effect Transistor

Construction, Principle of Operation, pinch-off voltage, Volt-Ampere characteristics, comparison of BJT and JFET, small signal Model, MOSFET: Depletion and Enhancement FETs-construction characteristics.

Special Purpose Devices: Breakdown Mechanisms in semi-Conductor Diodes, Zener diode characteristics, Zener diode as a simple regulator, principle of operation and Characteristics of Tunnel Diode (with help of Energy band diagram) Varactor Diode, Principle of operation of SCR.

TEXT BOOKS

1. Millman's Electronic Devices and circuits –J.Millman and C.Halkias, Mc GrawHill Mc Graw Hill
2. Micro Electronics by David bell
3. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

REFERENCE BOOKS

1. Network Theory by N. C. Jagan and C. Lakshminarayana, B. S. Publications.
2. Electronic Devices and Circuits- R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
3. Engineering circuit analysis-by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches)-2nd edition by Raymond A. DeCarlo and Pen-Min-Lin, Oxford University Press-2004.

Course Outcomes:

The student will be able to

1. Demonstrate strong fundamental back ground in Electrical Engineering.
2. Analyze and solve problems of ac and dc circuits.
3. Identify the value of different resistors.
4. Analyze and design various electronic circuits through various numerous
5. Practical circuit design examples using currently-available devices and standard-value components.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1201) ENGINEERING CHEMISTRY LAB
(Common to all Branches)

Course Objective:

The student will

1. Understand the importance of Chemical analysis in their daily life
2. Perform the different practical skills in conducting the lab experiments
3. Analyze the different results of the experiments when different external factors are being applied
4. Acquire experimental skills

Cycle-I

EXPERIMENT 1 : Determination of Conc. of $KMnO_4$ by colorimetric method.
EXPERIMENT 2 : Estimation of copper by colorimetric method.
EXPERIMENT 3 : Conductometric titration of mixture of acids vs strong base.
EXPERIMENT 4 : Titration of strong acid vs strong base by potentiometry.
EXPERIMENT 5 : Determination of pH of the given solution.
EXPERIMENT 6 : Determination of viscosity of sample oil by redwood viscometer
EXPERIMENT 7 : Preparation of Fe nanoparticles

Cycle-II

EXPERIMENT 8 : Estimation of hardness of water by EDTA method.
EXPERIMENT 9 : Estimation of manganese dioxide in pyrolusite
EXPERIMENT 10 : Determination of Surface tension of lubricants
EXPERIMENT 11 : Preparation of Aspirin
EXPERIMENT 12 : Preparation of Thiokol rubber

Course Outcomes:

The student will be able to

1. Identify the importance of chemical analysis in their daily life
2. Use different practical skills to analyze the results associated with the experiments build practical skills
3. Develop new environmental friendly and cost effective engineering compounds
4. Analyze the concepts of laboratory procedure

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1204) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common to ME, CE & MIE)

Course Objectives:

The student will

1. Recognize sounds of English
2. Apply stress and intonation while speaking
3. Develop Listening skills.
4. Develop introducing themselves and others.
5. Understand how to describe, debate and knows the types of presentations.

Syllabus: English Language Communication Skills Lab (ELCS) shall have two parts:

- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

- To enable students, develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
- To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives:

i) To involve students in speaking activities in various contexts

ii) To enable students express themselves fluently and appropriately in social and professional contexts:

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just a Minute (JAM) Sessions.

The following course content is prescribed for the **English Language Communication Skills Lab**.

EXPERIMENT 1:

CALL Lab:

Understand: Listening Skill- Its importance–Purpose- Process- Types- Barriers- Effective Listening.

Practice: Introduction to Phonetics–Speech Sounds–Vowels and Consonants–Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker.

Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues– Greetings–Taking Leave – Introducing Oneself and Others.

EXPERIMENT 2:

CALL Lab:

Understand: Structure of Syllables–Word Stress–Weak Forms and Strong Forms–Sentence Stress – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms-Sentence Stress – Intonation.

Testing Exercises

ICS Lab:

Understand: Features of Good Conversation–Strategies for Effective Communication.

Practice: Situational Dialogues–Role-Play- Expressions in Various Situations– Making Requests and Seeking Permissions - Telephone Etiquette.

EXPERIMENT 3:

CALL Lab:

Understand: Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation.

Testing Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines.

Practice: Giving Instructions–Seeking Clarifications–Asking for and Giving Directions– Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

EXPERIMENT 4:

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

Testing Exercises

ICS Lab:

Understand: Public Speaking–Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.

Practice: Making a Short Speech–Extempore- Making a Presentation.

EXPERIMENT 5:

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

Testing Exercises

ICS Lab:

Understand: Group Discussion- Interview Skills.

Practice: Group Discussion- Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

   The Computer Assisted Language Learning Lab has to accommodate 40 students with40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

   System Requirement (Hardware component):

   Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

   Computers with Suitable Configuration High Fidelity Headphones

2. **Interactive Communication Skills (ICS) Lab:**

   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio and video system and camcorder etc.

Lab Manuals:

1) A book entitled *—**ELCS Lab Manual–A Workbook for CALL and ICS Lab Activities"*** by Board of Editors: Hyderabad: Orient Black Swan Pvt. Ltd. 2016. Print.
2) Hart, Steve; Nair, Aravind R.; Bhambhani, Veena. ***—EMBARK- English for under graduates"*** Delhi: Cambridge University Press. 2016. Print.

Suggested Software:

1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley.
3. Punctuation Made Easy by Darling Kindersley.
4. Oxford Advanced Learner's Compass, 8th Edition.
5. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
7. TOEFL and GRE (KAPLAN, AARCO and BARRONS, USA, Cracking GRE by CLIFFS).

References:

1. Jayashree Mohanraj. *Let Us Hear Them Speak*. New Delhi: Sage Texts. 2015. Print. Hancock, M. *English Pronunciation in Use. Intermediate Cambridge*: Cambridge University Press. 2009. Print.

Course Outcomes:

The student will be able to

1. Analyze and use correct pronunciation.
2. Make use of stress and intonation properly while speaking and writing.
3. Tell the answers effectively after listening
4. Describe himself and others in day to day life situations.
5. Improve in handling debates and oral presentation

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1205) ENGINEERING WORKSHOP
(Common to ME, CE & MIE)

Course Objectives:

The student will

1. Execute application of various tools in carpentry, lathe machine works, house wiring
2. Recognize application of metal cutting and drilling
3. Analyze to perform various shape of wood material and metals
4. Fabricate metal items using welding and power tools
5. Demonstrate the works in foundry and plumbing

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1) Carpentry
2) Fitting
3) Tin-Smithy and Development of jobs carried out and soldering.
4) Black Smithy
5) House-wiring
6) Foundry
7) Welding

2. TRADES FOR DEMONSTRATION AND EXPOSURE:

- Plumbing, Machine Shop, Power tools in construction, wood working and mechanical engineering

Course Outcomes:

The student will be able to

1. Identify the tools used in workshop of different trades.
2. Perform the carpentry works of small shape and size.
3. Perform the basic fitting and electrical works. using the required tools
4. Perform welding works both gas and electrical
5. Perform the minor foundry and plumbing works using the required tools.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
I Year - II Semester	**2**	**0-0-0**	**0**

(E120F) PROFESSIONAL ETHICS

(Common to CSE, IT, ME & CIVIL)

Course Objectives:

The student will

1. Learn ethical values and attitudes.
2. Understand the roles of a professional.
3. Understand the current scenario and engineer's responsibility towards the society
4. Know the types of professional ethical codes.
5. Learn the need for ethical audit.

UNIT - I: Basic Concepts

Introduction, Ethics-Ethical Dilemma-Morals, emotional, intelligence, Indian and western thoughts on ethics, value education, domains of learning, human values, attitudes, Basic Ethical Principles. Meaning of profession, professionalism, professional's roles and professional risks, professional accountability, successful professional, engineering professionals, engineering ethics, roles of engineers,

UNIT - II: Global issues and safety

Introduction, current scenario, business ethics, environmental ethics, computer ethics, ethical hacking and its dilemma, ethics in research, intellectual property rights, patents, trademarks, managers and engineers responsibility, Engineering ethics.

UNIT – III: Ethical codes and audits

Introduction need and types of professional ethical codes, sample standard codes, ethical codes for corporate entities and non-profit organization, charitable institutions, limitations of the codes, need for ethical audit, ethical profile of organizations

REFERENCE BOOKS

1. Professional ethics and human value by D. R. Kiran, Tata McGraw Hills Education.
2. Ethics in engineering by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
3. Fundamental of Ethics by Edmund G Seebauer and Robert L.Barry, Oxford university press.
4. Professional ethics and human values by R. S. Nagarajan, New age international.
5. Professional ethics by R. Subramanian, Oxford press.

Course Outcomes:

The student will be able to

1. Make use of ethical values and attitudes in their life.
2. Implement once he/she becomes a professional.
3. Solve the issues related with environment and technology
4. Apply the different types of professional ethical codes in their organization.
5. Make use of the rules framed by the auditors.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**3**

(E210A) NUMERICAL TECHNIQUES AND TRANSFORMS

(Common to ME, MIE & CE)

Course Objectives:

The student will

1. Various difference operators and interpolation techniques.
2. Identify and classify the numerical problem to be solved
3. Learn the nature of curve and learn to trace it in a proper coordinate system.
4. Understand properties fourier series and fourier integral transforms which are mathematical devices from which we obtain the solutions of boundary value problems related to engineering
5. Understand the properties of Z-transforms and to solve the difference equations and to teach the fundamental concepts of PDE theory and analytical methods for solving PDEs Course Outcomes

UNIT - I: Finite Differences and Interpolation

Finite Differences- Differences of Polynomial- Factorial Notation-Relation between the operators-To find one or more missing terms- Newton's interpolation formulae-Central Difference interpolation Formulae-Gauss interpolation Formulae-Interpolation with unequal intervals- Lagrange's interpolation

UNIT - II: Numerical Solution of Partial Differential Equations

Introduction-Classification of second order equations-Finite approximation to derivatives-Elliptic Equations-Solution of Laplace equations-Solutions Poisson's equation-Parabolic equations- Solution of heat equation-Hyperbolic equations-Solution of Wave equation

UNIT – III: Applications of Derivatives:

Radius, center and circle of curvature, evolutes and envelopes. Tracing of curves in Cartesian and polar forms.

UNIT - IV: Fourier Series

Introduction-Euler's Formulae-Conditions foe Fourier Expansion-Functions having points of Discontinuity-change of interval-Odd and Even function-Expansions of Odd or Even periodic functions-Half range series

UNIT - V: Z-Transforms

Introduction-Definition-Some standard Z-Transforms-Linearity Property-Damping Rule-some standard result-Shifting un to the right and to the left Multiplication by n-Two

basic theorems (Initial and Final) – Some useful Z-transforms-Some useful inverse Z-transforms-Convolution
Theorem-Convergence of Z-Transforms-Two side Z-Transform-Evaluation of Z-Transforms- Applications to Difference Equation

TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
2. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons Publisher

REFERENCE BOOKS

1. Engineering Mathematics by N. P. Bali, Lakshmi Publications.
2. Introductory methods of Numerical analysis by S. S. Sastry, PHI Learning Pvt. Ltd

Course Outcomes

The student will be able to

1. Use the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi - spaced data values.
2. Formulate partial differential equations (PDEs) and seek understanding of their solutions, either obtained exactly or approximately by analytic or numerical methods and also the concept of a solution to an initial value problem.
3. Change the form of curve given in one co-ordinate system to another thereby making it to trace it in an easy way.
4. Acquire the knowledge of representation of a function as a Fourier series and will be able to apply the Fourier integral transforms in areas of engineering related to conduction of heat, free and forced vibrations of a membrane, transverse vibrations of a string etc.
5. Demonstrate the use of the transform technique of Z-transforms for discrete time signals and systems and they acquire knowledge in the technical methodology of solving Partial Differential Equations.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**4**	**1-0-0**	**4**

(E213A) MECHANICS OF SOLIDS

Course Objectives:

The Student will

1. Understand basic concepts of stress, strain and their relations based on linear elasticity. Material behaviors due to different types of loading.
2. Understand how to develop shear force and bending moment diagrams of a beam and to find the maximum bending moment/shear force and their locations
3. Understand and know how to calculate bending stresses and shear stresses in various beams.
4. Understand how to calculate principle stresses, strains and various theories of failure
5. Understand the behavior of shafts under torsion and stresses induced in thin and thick cylinders due to inside pressure

UNIT - I: Simple Stresses & Strains

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 and impact loadings.

UNIT - II: Shear Force and Bending Moment

Definition of beam–Types of beams–Concept of shear force and bending moment – Shear Force and Bending Moment diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between Shear Force and Bending Moment.

UNIT – III: Flexural Stresses

Theory of simple bending–Assumptions–Derivation of bending equation; Neutral axis – Determination of bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I section, T section, Angle and Channel sections.

Shear Stresses: Derivation of formula–Shear stress distribution across various beams sections like rectangular, circular, triangular, I section, T section, angle section and channel section.

UNIT - IV: Principal Stresses and Strains

Introduction–Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories of Failure: Introduction–Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Strain Energy and Shear Strain Energy Theory (Von-Mises Theory).

UNIT - V: Torsion of Circular Shafts

Theory of pure torsion–Derivation of Torsion equations–Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

Thin and Thick Cylinders: Thin seamless cylindrical shells–Derivation of formulae for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter and volume of thin cylinders– Thin spherical shells. Thick Cylinders - Lami's equations, Compound cylinders.

TEXT BOOKS

1. Engineering Mechanics of solids: Popov, PHI Publications, 2nd Edition, 2011.
2. Strength of Materials: S. Timshenko.

REFERENCE BOOKS

1. Strength of Materials: R.S. Kurmi and Gupta, S Chand Publications, 2013.
2. Strength of Materials: Jindal, Umesh Publications.
3. Mechanics of Structures Vol –I: H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.

Course outcomes:

The student will be able to

1. Predict mechanical behavior of the member by determining the stresses, strains and deflections produced by various loads
2. Identify failure behavior of beams by constructing shear force and bending moment diagrams.
3. Analyze failures due to bending stresses and shear stresses in different beams
4. Design the components applying various theories of failures.
5. Estimate the stresses and strain in circular shafts subjected to torsion and also in thick and thin cylinders for safe design.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**4**	**1-0-0**	**4**

(E213B) THERMODYNAMICS

Course Objectives:

The Student will

1. Get basic knowledge of comprehensive and rigorous treatment of classical thermodynamics while retaining an engineering perspective.
2. Understand the groundwork for subsequent studies in such fields as fluid mechanics, heat transfer and to prepare the students to effectively use thermodynamics in the practice of engineering.
3. Develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments.
4. Get a wealth of real world engineering examples to give students a feel for how thermodynamics is applied in engineering practice
5. Understand the second law of thermodynamics

UNIT - I: Introduction:

Basic Concepts: System, Control Volume, Surrounding, Boundaries and Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale-Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation.

UNIT - II:

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump , Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics

UNIT – III:

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non - flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes. Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables-Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

UNIT - IV:

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation , Carrier's Equation – Psychrometric chart.

UNIT - V:

Thermodynamic Cycles: Power cycles: Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericsson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles. Refrigeration Cycles: Bell-Coleman cycle- Vapour compression cycle-performance Evaluation.

TEXT BOOKS

1. Engineering Thermodynamics: PK Nag /TMH, 5th Edition
2. Engineering Thermodynamics/E Rathakrishnan, PHI, second Edition, 2013

REFERENCE BOOKS

1. Engineering Thermodynamics/DP Mishra/ Cengage Learning, Second impression 2012
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles, TMH
3. Thermodynamics – J. P. Holman, McGraw Hill

Course outcomes:

The student will be able to

1. Understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.
2. Conduct experiments regarding the measurement and calibration of temperatures and pressures in groups.

3. Identify the properties of substances on property diagrams and obtain the data from property tables
4. Define energy transfer through mass, heat and work for closed and control volume systems.
5. Apply Second Law of Thermodynamics and entropy concepts in analyzing the thermal efficiencies of heat engines

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**0-0-0**	**3**

(E213C) METALLURGY AND MATERIAL SCIENCE

Course Objectives:
The Student will

1. Get basic knowledge and learn the structure of metals, Understanding of the correlation between the internal structure of materials, their mechanical properties and various methods to quantify their mechanical integrity.
2. Learn to construct and interpretation of phase diagrams and Learn Iron-Carbon phase diagram and different types of heat treatment processes.
3. Learn structure, properties and applications of steel material.
4. Learn structure, properties and applications of ferrous and Non- ferrous material.
5. Get the basic knowledge on ceramics, polymers and composites with their properties and applications.

UNIT - I: Structure of Metals:
Crystallography, Miller's indices, Packing Efficiency, Density calculations. Grains and Grain Boundaries. Effect of grain size on the properties. Determination of grain size by different methods.
Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume - Rothery rules, Intermediate alloy phases.

UNIT - II: Phase Diagrams:
Construction and interpretation of phase diagrams, Phase rule. Lever rule. Binary phase Diagrams, Isomorphous, Eutectic and Eutectoid transformations with examples.

UNIT – III: Engineering Materials –I STEELS:
Iron-Carbon Phase Diagram and Heat Treatment: Study of Fe-Fe3C phase diagram. Construction of TTT diagrams. Annealing, Normalizing, Hardening and Tempering of steels, Hardenability. Alloy steels.

UNIT - IV: Engineering Materials –II:
CAST IRONS: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron.

Engineering Materials-III: Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Al-Cu phase diagram, Titanium and its alloys.

UNIT - V: Engineering Materials –IV:

Ceramics, Polymers and Composites: Crystalline ceramics, glasses, cermets: structure, properties and applications. Classification, properties and applications of composites. Classification, Properties and applications of Polymers.

TEXT BOOKS

1. Introduction to Physical Metallurgy: Sidney H. Avner, S Chand Publications, 2nd Edition, 1997.
2. Material Science and Metallurgy for Engineers: Kodgire, Everest Publications, 14th Edition, 2003.

REFERENCE BOOKS

1. Materials Science and engineering: William and callister.
2. Engineering Material and Metallurgy: Er Amandeep Singh Wadhva
3. Materials Science for Engineering Students: Traugott Fischer 2009 Edition.

Course Outcomes:

The Student will be able to

1. Determine the structure, packing factor and grain size of different metals.
2. Draw interpretation of phase diagrams and determine the phases of metals at different temperatures.
3. Identify the properties and structure of steel material.
4. Identify the properties and structure of ferrous and non- ferrous steel material.
5. Classify ceramics, polymers and composites with their properties and applications.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**2**	**0-0-3**	**4**

(E213D) MACHINE DRAWING

Course Objectives:

The student will

1. Understand drawing and develop capacity to represent any matter/object with the help of picture.
2. Develop primary knowledge of working drawing.
3. Produce orthographic drawing of different machine parts.
4. Develop skill to produce assembly drawings.
5. Develop skill to produce detailed drawings of machines parts from assembly drawing.

Machine Drawing Conventions:

Need for drawing conventions – introduction to SI conventions

1. Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
2. Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
3. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
4. Title boxes, their size, location and details - common abbreviations & their liberal usage.
5. Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
b) Keys, cottered joints and knuckle joint.
c) Rivetted joints for plates
d) Shaft coupling, spigot and socket pipe joint.
e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

c) Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS

1. Machine Drawing: K.L.Narayana, P.Kannaiah& K. Venkata Reddy, New Age Publishers, 4th Edition, 2010.
2. Machine Drawing: N.D. Bhatt, Charotar Publications, 47th Edition, 2012.

REFERENCE BOOKS

1. Machine Drawing : Ajeet Singh, TMH Publications, 4th Edition, 2010
2. Machine Drawing: P.S.Gill, Kataria Publications16th Edition, 1996
3. Machine Drawing: Junarkar.N.D., Pearson, 2009.

Course Objectives:

The student will be able to

1. Draft the technical ideas
2. Understand the functionality of various parts in a machine and visualize them for preparation of part drawings
3. Interpret the Assembly drawings for preparation of a production drawing
4. Analysis of complex Design Systems related to mechanical engineering
5. Utilize the skill of producing detailed drawings of machines parts from assembly drawing.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**2**

(E2108) BASIC ELECTRICAL AND ELECTRONICS LAB

Course Objectives:

The student will

1. Design and conduct experiments as well as to analyze and interpret data.
2. Provide practical experience with electrical components and verifying circuit theorems.
3. Understand the application of Networks theorems.

PART-A

EXPERIMENT 1 : Verification of KVL & KCL

EXPERIMENT 2 : Verification of Thevinin's & Norton's Theorem

EXPERIMENT 3 : Verification of Maximum power transfer theorem. Verification of DC & AC excitation with resistive & reactive loads.

EXPERIMENT 4 : Verification of superposition theorem & RMS value of complex wave

EXPERIMENT 5 : Verification of compensation theorem

EXPERIMENT 6 : Verification of reciprocity & millman's theorem

EXPERIMENT 7 : Series & parallel resonance - Timming, Resonant frequency, Bandwidth and Q-factor determination for RLC network

EXPERIMENT 8 : Estimation of hardness of water by EDTA method.

PART-B

EXPERIMENT 1 : PN Junction diode characteristics kit

EXPERIMENT 2 : Zener diode characteristics kit

EXPERIMENT 3 : Half wave rectifier with and without filters kit

EXPERIMENT 4 : Full wave rectifier with and without filters kit

EXPERIMENT 5 : CE Characteristics kit

EXPERIMENT 6 : CB Characteristics kit

EXPERIMENT 7 : CE Amplifier

EXPERIMENT 8 : CE Amplifier

Course Outcomes:

The student will be able to

1. Apply Network theorems for analysis of RLC circuit.
2. Have hands on experience in studying the behavior of passive components
3. Understand and apply basic circuit theory and apply them to electrical engineering problems

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**2**

(E2109) METALLURGY LAB

Course Objectives:

The student will

1. Understand the preparation and study of micro structures of pure metal Fe, Cu, Al.
2. Gain knowledge of microstructures of different types of ferrous and non-ferrous alloys.
3. Study the microstructures of heat treated steels.
4. Gain knowledge of harden ability of steels.

EXPERIMENT 1 : Preparation and study of the Micro Structure of pure metal Fe.
EXPERIMENT 2 : Preparation and study of the Micro Structure of pure metal Cu.
EXPERIMENT 3 : Preparation and study of the Micro Structure of pure metal Al.
EXPERIMENT 4 : Preparation and study of the Microstructure of Mild steels.
EXPERIMENT 5 : Preparation and study of the Microstructure of low carbon steels
EXPERIMENT 6 : Preparation and study of the Microstructure of high C steels.
EXPERIMENT 7 : Study of the Micro Structures of Cast Irons.
EXPERIMENT 8 : Study of the Micro Structures of Copper Alloys.
EXPERIMENT 9 : Study of the Micro Structures of Aluminum Alloys.
EXPERIMENT 10 : Study of the Micro structures of Heat treated steels.
EXPERIMENT 11 : Hardenability of steels by Jominy End Quench Test.
EXPERIMENT 12 : To find out the hardness of various Heat treated steels.

Course Outcomes:

The student will be able to

1. Understand the microstructure for pure metal Fe, Cu, Al.
2. Implement heat treatment operations and find out the micro structure for heat treated steels.
3. Perform the hardness test on various steels.
4. Evaluate the harden ability of steels by Jominy Quench Test.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**2**

(E2110) MECHANICS OF SOLIDS LAB

Course Objectives:

The student will

1. Learn to apply loads to various materials under different equilibrium conditions.
2. Perform tests on materials in tension, compression, torsion, bending, and impact.
3. Perform required tests, analyze subsequent data, and present the results in a professionally prepared report.
4. Learn the machines and equipment used to determine experimental data include universal testing machines, torsion equipment, spring testing machine, compression testing machine etc.
5. Learn the concept of impact loading and to determine impact values for various materials

EXPERIMENT 1 : Direct tension test
EXPERIMENT 2 : Bending Test
EXPERIMENT 3 : Deflection test on Simply supported beam
EXPERIMENT 4 : Deflection test on Cantilever beam
EXPERIMENT 5 : Torsion test
EXPERIMENT 6 : Brinells hardness test
EXPERIMENT 7 : Rockwell hardness test
EXPERIMENT 8 : Test on springs
EXPERIMENT 9 : Compression test on cube
EXPERIMENT 10 : Impact test by Izod method
EXPERIMENT 11 : Impact test by Charpy method
EXPERIMENT 12 : Punch shear Test

Course Outcomes:

The student will be able to

1. Determine the modulus of rigidity and young's modulus for ductile materials.
2. Analyze the various points on stress strain diagram.
3. Calculate & Compare the hardness values for various materials.
4. Experiment on a spring to interpret the stiffness and shear modulus.
5. Apply the concept of impact loading and to determine impact values for various materials and analyze and Determine the compression strength ,shear stress of different materials

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

(E223A) PRODUCTION TECHNOLOGY

Course Objectives:

The student will

1. Understand basic metal forming and manufacturing processes like casting and welding
2. Learn various aspects of different manufacturing techniques such as various casting methods, forming methods and welding methods
3. Have a broad knowledge to design a manufacturing process including metal casting and welding
4. Understand the steps in these manufacturing process like design of moulds, dies etc
5. Understand about blow & injection modeling

UNIT - I: Casting

Steps involved in making a casting–Advantage of casting and its applications. Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems.

Solidification of casting – Concept – Solidification of pure metal and alloys, short and long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes, Centrifugal casting, Die casting, Investment casting.

Methods of Melting: Crucible melting and cupola operation, steel making processes.

UNIT - II: Welding

Classification of welding process 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 and Cutting of ferrous, non-ferrous metals.

UNIT – III:

Inert Gas welding, TIG and MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering and Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT - IV:

Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.

EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion.

Forging processes: Principles of forging–Tools and dies–Types Forging–Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects. Stamping, forming and other cold working processes: Blanking and piercing – Bending and forming– Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations

UNIT – V: Processing of Plastics

Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection moulding). Introduction to Polymer based composite materials.

TEXT BOOKS

1. Manufacturing Technology: P. N. Rao, TMH, 2nd Edition, 2000.
2. Manufacturing Processes for Engineering Materials: Serope Kalpakjian and Steven RSchmid, Pearson Publishers.

REFERENCE BOOKS

1. Production Technology: Sharma P C, S. Chand Publications, 6th Edition, 2006.
2. Production Technology: R.K. Jain, Khanna Publications, 2005.
3. Production Engineering: Suresh Dalela & Ravi Shankar, Galgotia Publications Pvt. Ltd.

Course Outcomes:

The student will be able to

1. Perform the patterns for casting process
2. Implement the welding knowledge in real time applications
3. Perform the tests to identify the defects in the welding zone
4. Identify the difference between cold and hot working processes
5. Differentiate blow and injection moulding

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**4**	**1-0-0**	**4**

(E223B) KINEMATICS OF MACHINERY

Course Objectives:

The student will

1. Understand the various types of mechanisms and machines
2. Study the relative motion, velocity, and accelerations of the various elements in a mechanism.
3. Understand different types of steering mechanisms and straight line motion mechanisms
4. Understand the analysis of velocity and acceleration in CAMS
5. Know the different types of gears and gear trains

UNIT - I: Mechanisms

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 .

Machines: Mechanism and machines–classification of machines–kinematic chain–inversion of mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains. Mechanical Advantage –Grubler's criterion.

UNIT - II: Kinematics

Velocity and acceleration–Motion of link in machine–Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous center of rotation, centroids and axodes–relative motion between two bodies – Three centers in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT–III: Steering Mechanisms

Conditions for correct steering–Davis Steering gear, Ackermans steering gear – velocity ratio.

Hooke's Joint: Single and double Hooke's joint –Universal coupling–application–problems.

Straight Line Motion Mechanisms: Exact and approximate copiers and generated types– Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

UNIT -IV: Cams

Definitions of cam and followers–their 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 in the above 3 cases.

Analysis of motion of followers: Roller follower–circular cam with straight, concave and convex flanks.

UNIT -V:

Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

Gear Trains: Introduction–Train value–Types–Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS

1. Theory of Machines: Thomas Bevan, Pearson Publications, 3rd Edition, 2011.
2. Theory of Machines: R.K Bansal, S Chand, 5th Edition, 2010.

REFERENCE BOOKS

1. Theory of Machines: R.S Khurmi& J.K Gupta, S Chand, 14th Edition, 2013
2. Theory of Machines: PL. Ballaney, Khanna publishers.
3. Mechanism and Machine Theory: JS Rao and RV Dukkipati, New Age

Course Outcomes:

The student will be able to

1. Describe the concepts of machines, mechanisms and related terminologies.
2. Analyze planar mechanism for displacement, velocity and acceleration graphically.
3. analyze different types of steering gear mechanisms to determine velocity ratio and straight-line motion mechanisms to generate exact and approximate straight line motions
4. Analyze various motion transmission elements like cams.
5. Apply the knowledge of the different types of gears and gear trains

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**4**	**1-0-0**	**4**

(E223C) APPLIED THERMODYNAMICS – I

Course Objectives:

The student will

1. Gain the basic knowledge of working of air standard cycles and understand the comparison with operation on actual cycles and various losses while operating engines based on actual cycles.
2. Know the process of combustion and different stages of combustion in SI and CI engines.
3. Know the working principles of air compressors and their classification based on different parameters
4. Understand working principles of dynamic and axial flow compressors to evaluate their performance.

UNIT - I: Actual Cycles and Their Analysis

Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles Of CI Engines.

I.C. Engines : Classification - Working principles, Valve and Port Timing Diagrams, Air–Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT - II: Combustion in S.I. Engines

Normal Combustion and abnormal combustion–Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

Combustion in C.I. Engines : Four stages of combustion–Delay period and its importance–Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – III: 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 - IV: Compressors

Classification–positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.

UNIT - V: Rotary (Positive displacement type)

Roots Blower, vane sealed compressor, Lysholm compressor–mechanical details and principle of working – efficiency considerations.

Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation–velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors: Mechanical details and principle of operation–velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

TEXT BOOKS

1. I.C. Engines: V. Ganesan, TMH, 4th Edition, 2012.
2. IC Engines: Ramalingam, Scietech Publishers.

REFERENCE BOOKS

1. IC Engines: Mathur & Sharma : Dhanpath Rai & Sons.
2. Thermal Engineering: Rajput, Lakshmi Publications.
3. I.C. Engines: Heywood, McGrawHill.

Course Outcomes:

The student will be able to

1. Analyze the working of IC engines on actual cycles and its application in industry and in automobiles
2. Differentiate the combustion process in both CI and SI engines and identify the various effects of abnormal combustion
3. Analyze the working principles of various types of compressors and selection for industrial applications
4. Evaluate the performance of dynamic and axial flow compressors

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**4**	**1-0-0**	**4**

(E223D) MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

Course Objectives:

The student will

1. Understand the basic principles of fluid mechanics
2. Identify various types of flows
3. Understand various types of head losses in flow through pipes
4. Understand boundary layer concept
5. Evaluate the performance of hydraulic turbines and pumps

UNIT - I: Fluid Statics

Dimensions and UNITs: physical properties of fluids- specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion- atmospheric, gauge and vacuum pressures – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT - II: Fluid Kinematics

Stream line, path line and streak lines and stream tube, classification of flows-steady and unsteady, uniform and non uniform, laminar and turbulent, rotational and irrotational flows-equation of continuity for one dimensional flow and three dimensional flows.

Fluid Dynamics: Surface and body forces–Euler's and Bernoulli's equations for flow along a streamline, momentum equation and its application on force on pipe bend.

UNIT – III: Closed conduit flow

Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipesin series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturimeter, and orifice meter, Flow nozzle.

Boundary Layer Concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

UNIT - IV: Basics of turbo machinery

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

Hydraulic Turbines : Classification of turbines, Heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory- functions and efficiency.

Performance of hydraulic turbines: Geometric similarity, UNIT and specific quantities,

characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT - V: Centrifugal pumps

Classification, working, workdone – barometric head- losses and efficiencies specific speed- performance characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH, Stadanrd Book House, 20th Edition, 2015.
2. Fluid Mechanics and Hydraulic Machines by Rajput, Laxmi Publications

REFERENCE BOOKS

1. Fluid Mechanics and Fluid Power Engineering: D.S. Kumar, Kotaria& Sons.
2. Fluid Mechanics and Machinery: D. Rama Durgaiah, New Age International.
3. Hydraulic Machines: Banga& Sharma, Khanna Publishers.

Course Outcomes:

The student will be able to

1. Explain the effect of fluid properties on a flow system.
2. Identify type of fluid flow patterns and describe continuity equation.
3. Analyze the practical applications of Bernoullis applications to measure flow rate and velocity of fluid flow
4. Identify the suitable turbines and pumps to work in the given conditions
5. Analyze the performance of hydraulic turbines and pumps

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

(E223E) INSTRUMENTATION AND CONTROL SYSTEMS

Course Objectives:
The student will

1. Understand the principles of measurement – Measurement systems and descriptions of measuring instruments
2. Know the measurement levels for temperature, displacements, pressure and level of measurements.
3. Understand the usage of instruments for Expansion, Electrical Resistance, Thermistor, Thermocouple, Pyrometers and Temperature Indicators, using the tachometers
4. Understand various types of stress and strain measurements and measurement of humidity.
5. Know open and closed systems Servomechanisms with block diagrams and temperature, speed and position control systems.

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.

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

UNIT - II: Measurement of Temperature

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

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

Measurement of Level: Direct method–Indirect methods– capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubbler level indicators

UNIT – III: Flow Measurement

Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot–wire anemometer, Laser Doppler Anemometer (LDA).

Measurement of Speed: Mechanical Tachometers–Electrical tachometers–Stroboscope, Non- contact type of tachometer.

Measurement of Acceleration and Vibration: Different simple instruments–Principles of Seismic instruments – Vibrometer and accelerometer using this principle.

UNIT - IV: Stress Strain Measurement

Various types of stress and strain measurements–electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.

Measurement of Humidity: Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter

UNIT - V: Measurement of Force, Torque And Power

Elastic force meters, load cells, Torsion meters, Dynamometers.

Elements of Control Systems: Introduction, Importance–Classification–Open and closed systems Servomechanisms – Examples with block diagrams – Temperature, speed and position control systems.

TEXT BOOKS

1. Measurement Systems: Applications and Design: D.S Kumar, Anuradha Agencies
2. Instrumentation, Measurement and Analysis: B. C. Nakra& K. K. Choudhary, TMH, 1999.

REFERENCE BOOKS

1. Fluid Mechanics and Fluid Power Engineering: D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery: D. Rama Durgaiah, New Age International.
3. Hydraulic Machines: Banga & Sharma, Khanna Publishers.

Course Outcomes:

The student will be able to

1. Apply the knowledge to measure any sort of object without any errors Use the instrument perfectly
2. Utilize the tachometers in measuring by thermo couple, pyrometer, and temperature indicators
3. Perform experiments by utilizing Electrical Resistance, Thermistor, Thermocouple, Pyrometers and Temperature Indicators
4. Apply the concept of humidity and stress stain measurements in real time
5. Analyze servomechanisms speed and position control systems

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2208) PRODUCTION TECHNOLOGY LAB

Course Objectives:

The student will

1. Understand the importance of basic principles of Production Engineering.
2. Understand the concept of casting process
3. Understand the concept of mechanical press working processes
4. Understand the different welding concepts and learn the preparation of moulds

I. METAL CASTING LAB :

EXPERIMENT 1: Pattern Design and making - for one casting drawing

EXPERIMENT 2: Permeability test on moulding sand

EXPERIMENT 3: Moulding Melting and Casting - 1 Exercise

II. WELDING LAB :

EXPERIMENT 1: ARC Welding Lap & Butt Joint - 2 Exercises

EXPERIMENT 2: Spot Welding - 1 Exercise

EXPERIMENT 3: TIG welding

EXPERIMENT 4: Gas Welding-1 Exercise

EXPERIMENT 5: Brazing-1 Exercise

EXPERIMENT 6: Plasma welding

III. MECHANICAL PRESS WORKING :

EXPERIMENT 1: Hydraulic Press: for drawing operations.

EXPERIMENT 2: Blanking and piercing operations and study of simple, compound and progressive press tools

EXPERIMENT 3: Bending other operations

IV. PROCESSING OF PLASTICS

EXPERIMENT 1 : Injection Moulding

EXPERIMENT 2: Blow Moulding

Course Outcomes:

The student will be able to

1. Apply the knowledge to prepare cavities for casting process
2. Operate arc welding, gas welding and resistance welding equipment
3. Apply manufacturing methods such as casting and metal joining process for real time requirements
4. select appropriate manufacturing techniques like sheet metal processes and metal cutting processes

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2209) MECHANICS OF FLUIDS AND HYDRAULIC MACHINES LAB

Course Objectives:

The student will

1. Provide practical knowledge in verification of principles of fluid flow
2. Impart knowledge in measuring pressure discharge and velocity of fluid flow
3. Understand major and minor losses
4. Gain knowledge in performance testing of hydraulic turbines and Hydraulic pumps at constant speed and head.

EXPERIMENT-1: Impact of jets on Vanes.
EXPERIMENT-2: Performance Test on Pelton Wheel.
EXPERIMENT-3: Performance Test on Single Stage Centrifugal Pump.
EXPERIMENT-4: Performance Test on Multi Stage Centrifugal Pump.
EXPERIMENT-5: Performance Test on Reciprocating Pump.
EXPERIMENT-6: Calibration of Venturimeter.
EXPERIMENT-7: Calibration of Orifice meter.
EXPERIMENT-8: Determination of friction factor for a given pipe line.
EXPERIMENT-9: Determination of loss of head due to sudden contraction in a pipeline
EXPERIMENT-10: Verification of Bernoulli's Theorems.
EXPERIMENT-11: Performance test on Francis Turbine.
EXPERIMENT-12: Calibration of Mouth piece / Orifice apparatus

Course Outcomes:

The student will be able to

1. Perform the analysis on turbines and pumps used in power plants
2. Understand and analyze practical problems in all power plants
3. Aware of major and minor losses
4. Analyze a variety of tactical fluid flow devices and utilize fluid mechanics principles in design

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2210) INSTRUMENTATION LAB

Course Objectives:

The student will

1. Understand the usage of common measurement equipment
2. Equip with the basic knowledge of Pressure, Temperature, flow, speed strain and angular measurements.
3. Understand working of measuring instruments
4. Make the students to apply previously-learned engineering concepts to compare theoretical predictions with actual experimental results

EXPERIMENT 1 : Calibration of Pressure Gauges

EXPERIMENT 2 : Calibration of transducer for temperature measurement

EXPERIMENT 3 : Study and calibration of LVDT transducer for displacement measurement

EXPERIMENT 4 : Calibration of strain gauge for temperature measurement.

EXPERIMENT 5 : Calibration of thermocouple for temperature measurement.

EXPERIMENT 6 : Calibration of capacitive transducer for angular displacement.

EXPERIMENT 7 : Study and calibration of photo and magnetic speed pickups for the measurement of speed

EXPERIMENT 8 : Calibration of Resistance temperature detector for temperature measurement

EXPERIMENT 9 : Study and calibration of a rotameter for flow measurement

EXPERIMENT 10 : Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads

EXPERIMENT 11 : Study and calibration of McLeod gauge for low pressure.

Course Outcomes:

The student will be able to

1. Calibrate instrument and conduct the experiments with minimum error in measurements
2. Apply the basic knowledge of Pressure, Temperature, flow, speed strain and angular measurements
3. Calibrate the various instruments also he/she knows to apply the instrument in various fields
4. Select the proper instrument for making measurements of physical quantities (e.g., pressure and temperature) commonly encountered by mechanical engineers

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-2-0**	**0**

(E2211) GENDER SENSITIZATION

(Common to ME,CE&MIE)

UNIT -I: Gender: Why should we study it?, Socialization: Making women, Making Men, **i**ntroduction, Preparing For Womanhood, Growing up male, First lessons in caste, Different masculinities.

UNIT -II: Women's Work: Its Politics and Economics,

Fact and fiction, Unrecognized and unaccounted work, Further reading: Wages and conditions of work, Domestic Violence: Speaking Out, Is home a safe place?, When women unite [Film], Rebuilding lives, Further reading: New forums for justice.

UNIT–III: Just Relationships: Being Together as Equals,

Mary kom and Onler, Love and acid just do not mix, Love letters, Mothers and fathers, **Further Reading:** Rosa Parks – The brave heart

TEXT BOOKS

1. Towards a world of equals by A. Suneetha Susic Tharu publication Telugu academy Hyderabad.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E310A) MANAGEMENT SCIENCE FOR ENGINEERS

Course Objects:

The student will

1. Understand Caste System
2. Learn women's work its politics and economics
3. Them aware rebuilding lives.
4. Understand about relationships, responsibilities and gender identities

UNIT I: Introduction to Managerial Economics, Concepts of Managerial Economics: Demand Analysis: Law of Demand, Elasticity of demand & Demand Forecasting. **Production and cost Analysis:** Production functions, Laws of Returns, Economies of scale. **Cost Concepts:** Different types of costs: Variable cost, Fixed cost, Marginal cost, Semi-variable cost. Break-even Analysis.

UNIT II: Market Structures: Different types of Markets.
Pricing: Methods of Pricing and strategies, Skimming and Penetration Pricing.
Capital budgeting: Estimation of fixed and working capital, Methods & sources of raising capital. Methods of capital budgeting, Traditional and Discounted Techniques.
Financial accounting & Financial Analysis: Overview of financial Accounts, Journal, Subsidiary books, Ledger, Trial Balance and Preparation of Trading Account, Profit & Loss Account and Balance Sheet. Financial Analysis with the help of Ratios.

UNIT III: Management: Functions of management. Taylor's scientific management theory, Fayol's principles of management.
Designing of organization structures: Different Methods with Merits and demerits and their suitability.
Human Recourse Management: Recruitment, Selection, Training and Development and Permanence Appraisal.

UNIT IV: Operation Management: Types of plant layout, Methods of production, work, study-procedure involved in Methods study and work Measurement. Statistical quality control. R, C & P charts
Project Management: Program Evaluation and Review Technique (P E R T), critical path method (C P M). Identification of critical path.

UNIT V: Material Management: Objectives, Need for Inventory Control, EOQ, ABC Analysis, VED Analysis, Purchase procedure, stores Management.
Marketing: Functions, Marketing Mix, Marketing strategies based on product life cycle, channels of distributions.

TEXT BOOKS :

1. Managerial Economics& Financial Accounting: Dr. M. Kasi Reddy, Dr. S. Saraswathi, Prentice Hall of India.

2. Managerial Economics: Varshney & Maheswari, Sultan Chand, 2009.

REFERENCES:

3. Financial Accounting for Management: Ambrish Gupta, Pearson Education, New Delhi, 2009.

4. Financial Accounting a Managerial Perspective: Narayanaswamy, PHI, 2008.

5. Financial Accounting, S. N. Maheswari& S.K. Maheswari, Vikas, 2008.

Course Outcomes:

The student will be able to

1. Describes the basic structure of Caste system in India and the major four categories to which all castes could be
2. Learn to keep themselves safe and alive in the face of domestic violence.
3. Learn to maintain equality in gender. The student should have understood the responsibility of being good
4. describes the basic structure of Caste system in India and the major four categories to which all castes could be

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E313A) MACHINE TOOLS AND METROLOGY

Course Objectives:

The student will

1. Learn fundamental knowledge and principles in material removal processes.
2. Understand the fundamentals and principles of metal cutting to practical applications through lab using lathes, milling , grinding machines etc
3. Learn the fundamentals of machining processes and machine tools and to develop knowledge and importance of metal cutting parameters.
4. Understand systems of limits and fits
5. Learn how to measure surface roughness of the surface

UNIT – I: Metal cutting: Introduction, elements of cutting process – Geometry of single point tools. Chip formation and types of chips. Cutting tool materials
Engine lathe – Principle of working, types of lathe, specifications. Taper turning, – Lathe attachments. Capstan and Turret lathe – Single spindle and multi-spindle automatic lathes – tool layouts.

UNIT – II: Drilling and Boring Machines – Principles of working, specifications, types, and operations performed; twist drill. Types of Boring machines and applications. Shaping, slotting and planning machines - Principles of working – machining time calculations.

UNIT – III: Milling machines – Principles of working – Types of milling machines – Geometry of milling cutters – methods of indexing.
Grinding – theory of grinding – classification of grinding machines. Types of abrasives, bonds. Selection of a grinding wheel. Lapping, honing and broaching machines, Introduction to jigs & Fixtures.

UNIT – IV: Limits, fits and tolerances- Unilateral and bilateral tolerance system, hole and shaft basis system. Interchangeability and selective assembly, FD and IT grades and fit designations.
Limit Gauges: Taylor's principle, Design of GO and NO GO gauges Measurement of angles, Bevel protractor, Sine bar. Measurement of flat surfaces, straight edges, surface plates, optical flat and auto collimator, precision polygon.

UNIT – V: Surface Roughness Measurement: Roughness, Waviness. Surface roughness parameters, symbols roundness measurement by taylor Habson Talyrond Values. Methods of measurement of surface finish, Talysurf.

Screw thread measurement, Gear measurement; Machine Tool Alignment Tests on lathe, milling and drilling machines.
Coordinate Measuring Machines: Types and Applications of CMM.

TEXT BOOKS:

1. Engineering Metrology / I C Gupta./ Danpath Rai
2. Principles of Machine Tools, Bhattacharya A and Sen. G.C. New Central Book Agency.

REFERENCE BOOKS:

1. Production Technology by H.M.T. (Hindustan Machine Tools)
2. BIS Standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
3. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
4. Workshop Technology – Vol.-II, B.S. Raghui Vamsi
5. Elements of Work Shop Technology – Vol. II, Hajra Choudry, Media Promoters.
6. Fundamentals of Metal Machining and Machine Tools, Geofrey Boothroyd, TMH

Course Objectives:

The student will be able to

1. Apply cutting mechanics to metal machining based on cutting force and power consumption.
2. Operate the lathe, milling machines, grinding machines and drill press etc.
3. Select cutting tool materials and tool geometries for different metals.
4. Become aware of existing systems of limits, fits, theory of linear and angular measurements.
5. Apply various types of measuring instruments and surface roughness measuring methods.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E313B) DYNAMICS OF MACHINERY

Course Objectives:
The student will

1. Understand techniques for studying motion of Machines and their components under the influence of forces due to inertia and externally applied load system
2. Understand the precession motion gyroscopic principles and its effects on rotating members
3. Assess the Dynamics of mechanical elements used in IC engines and automobiles
4. Deal with balancing of rotating and reciprocating parts of various machines and to study the influence of primary and secondary forces involved in the system
5. Understand the concepts of free and forced vibrations in machines and its dynamic analysis

UNIT – I: Precession: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero-planes and ships.
Static And Dynamic Force Analysis Of Planar Mechanisms: Introduction–Free Body Diagrams – Conditions for equilibrium – Two, three and four force systems – Inertia forces and D' Alembert's Principle – planar rotation about a fixed center.

UNIT – II: Friction and Friction Clutches: Introduction to Friction, Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch and Centrifugal Clutch.
Brakes and Dynamometers: Simple block brakes, internal expanding brake, band brake of vehicle. Dynamometers – absorption and transmission types. General description and methods of operations.

UNIT – III: Turning Moment Diagram And Flywheels: Turning moment–Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy– Flywheels and their design.
Governers: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung Governors with auxiliary springs. Sensitiveness, Isochronism and hunting.

UNIT - IV: Balancing of Rotating masses: Balancing of rotating, single and multiple masses in single and different planes
Balancing of Primary and Secondary Reciprocating Masses: Primary and Secondary balancing of reciprocating masses, Analytical and graphical methods - Unbalanced forces and couples Balancing of V, multi cylinder inline and radial engines for primary and secondary balancing, locomotive balancing.

UNIT – V: Vibration: Free Vibration of mass attached to vertical spring–Simple problems on free damped and forced vibration.

TEXT BOOKS:

1. Theory of Machines: T.Bevan, S Chand Publications, 3rd Edition.
2. Theory of Machines: SS Ratan, Tata Mc Graw Hill, 2007 reprint.

REFERENCES :

1. Theory of Machines and Mechanisms: P. L .Ballaney, Orient Publishers.
2. Kinematics and Dynamics of Machinery: R. L. Norton, Mc Graw – Hill.
3. Mechanism and Machine Theory: J.S Rao and RV Dukkipati, New Age.

Course Outcomes:

The student will be able to

1. Design linkages and mechanisms for a given motion associated with forces
2. Analyze the effect of precession motion and gyroscopic couples on moving bodies viz automobiles, aeroplanes and ships
3. Analyze the effect of dynamics on various mechanical elements associated with IC engines and automobiles
4. Understand the significance of balancing moving parts and its dynamic analysis to achieve the steady state of equilibrium
5. Understand the behaviour of vibration and its effects on dynamic machine members

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E313C) DESIGN OF MACHINE MEMBERS - I

Course Objectives:

The student will

1. Gain the basic knowledge of formulation and analysis of different machine components
2. Understand how to formulate and analyze stresses and strains in machine elements
3. Learn and design power transmission shafts carrying various elements with geometrical features.
4. Learn and design mechanical springs.
5. Acquainted with standards, safety, reliability, importance of dimensional parameters and manufacturing aspects in mechanical design.

UNIT – I: Introduction: General considerations in the selection of Engineering Materials and their properties, Manufacturing considerations in design, BIS codes for steels.

Stresses in Machine Members& Fatigue Loading: Design Types of stresses–stress strain relations – static theories of failure – factor of safety – Design for strength and rigidity – preferred numbers - The concept of stiffness in tension, bending, torsion and combined situations. Stress concentration – Theoretical stress Concentration factor, Fatigue stress concentration factor notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength –Goodman and Soderberg theories of failures.

UNIT – II: Axially Loaded Joints: Keys, Cotters and Knuckle Joints: Design of Keys-stresses in keys-cotter joints-spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

Shaft Couplings: Rigid couplings–Muff, Split muff and Flange couplings. Flexible couplings–Pin bush coupling.

Design of Shafts: of solid and hollow shafts for strength and rigidity–Design of shafts for combined loads – Shaft sizes – BIS codes – Design of shaft for gear and belt drives.

UNIT – III: Riveted Joints: Modes of failure of riveted joints–Strength Equations–efficiency of riveted joints - Design of boiler joints – eccentrically loaded riveted joints.

Welded Joints: Design of Fillet welds - axial loads - Circular fillet welds - bending and0torsion – eccentrically loaded joints.

Bolted Joints: Design of bolts with pre stresses–Design of joints under eccentric loading–bolts of uniform strength, Cylinder cover joints.

UNIT – IV: Mechanical Springs: Stresses and deflections of helical springs–Extension – compression springs – Springs for static and fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs – Coaxial springs.

UNIT – V: Power Transmission systems-Pulleys: Transmission of power by Belt and Rope Drives, Transmission efficiencies, Belts: Flat and V types-Ropes-Pulleys for belt and rope drives, Materials, Chain drives.

TEXT BOOKS :

1.Mechanical Engineering Design: Bahl and Goel, Standard Publications

2.Machine Design by Pandya and Shah, Mc Grahill,2007

REFERENCE BOOKS:

1. Design of Machine Elements/V.M. Faires
2. Machine design/ Schaum Series.
3. Machine Design by Khurmi

Course Outcome:

The student will be able to

1. Analyze, design and select machine elements for various applications
2. Analyze Strength/Failure theories and Safety factors for machine members under steady and fatigue loads.
3. Acquire procedure to analyze and design of permanent joints such as Riveted and welded joints etc. for different applications. shafts, keys and shaft couplings
4. Identify various types of springs and their applications and learn how to design helical and leaf springs with practical engineering problems
5. Acquire procedure to analyze and design of temporary joints bolted joints for different applications

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-3-0**	**2**

(E3107) MACHINE TOOLS LAB

Course Objective:

The student will

1. Understand the working principles of general purpose Machines like Lathe Machine, Drilling Machine and Milling Machine
2. Gain knowledge of working of all parts of the general purpose Machines.
3. Undergo hands on training on operation of all the general purpose Machines and carry out operations like turning, drilling, slotting, milling, thread cutting.
4. Understand the working of special purpose machines like surface grinding machine, cylindrical grinding machine and tool and cutter grinding Machines.
5. Undergo hands on training on special purpose machines.

EXPERIMENT 1: Introduction of general purpose machines -Lathe, Drilling machine, machine.

EXPERIMENT 2: Study parts of Shaper machine, slotting machine.

EXPERIMENT 3: Study of parts of all grinding machines

EXPERIMENT 4: Study of material, geometry of tools used in metal cutting like single point, multipoint cutting tools

EXPERIMENT 5: Plain and step turning on lathe machine

EXPERIMENT 6: Taper turning on lathe machine

EXPERIMENT 7: Thread cutting and knurling on -lathe machine.

EXPERIMENT 8: Drilling and Tapping

EXPERIMENT 9: Shaping

EXPERIMENT 10: Slotting

EXPERIMENT 11: Milling

EXPERIMENT 12: Surface Grinding

EXPERIMENT 13: Cylindrical grinder

EXPERIMENT 14: Tool and cutter grinder

Course Outcomes:

The students will be able to

1. Use and apply various measuring instruments in carrying the machine operations.
2. Make various shapes to the given metal by using general purpose machines.
3. Make required shapes to the given metal objects by operating special purpose Machines like cylindrical grinding machines, surface grinding machines.
4. Make different rake angles to the given metal removing tools.
5. Handle the special purpose machines.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-3-0**	**2**

(E3108) METROLOGY LAB

Course Objectives:

The student will

1. Educated on different measurement systems and on common types of errors
2. Learn alignment tests on Lathe, Drilling, Milling and Grinding machines.
3. Introduced with measuring equipments used for linear and angular measurements.
4. Get familiarized with surface roughness measurements on machine components.

EXPERIMENT 1: Measurement of lengths, heights and diameters by vernier calipers and micrometers.

EXPERIMENT 2: Measurement of bores by internal micrometers and dial bore indicators.

EXPERIMENT 3: Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height of spur gear.

EXPERIMENT 4 : Alignment Tests on Lathe Machine

EXPERIMENT 5: Alignment Tests on Drilling

EXPERIMENT 6: Alignment Tests on milling

EXPERIMENT 7: Alignment Tests on lathe

EXPERIMENT 8: Alignment Tests on grinding Machine

EXPERIMENT 9: Tool makers microscope and its applications

EXPERIMENT 10: Angle and taper measurements by Bevel protractor and Sine bars

EXPERIMENT 11: Flatness testing of surface plate.

EXPERIMENT 12: Thread measurement by Three wire method

EXPERIMENT 13: Usage of Ring and Plug Gauges.

EXPERIMENT 14: Surface roughness measurement using Tallysurf.

Course Outcomes:

The students will be able to

1. Work in Quality control and quality assurances divisions in industries
2. Perform alignment tests for different machines.
3. Measure linear and angular measurements.
4. Maintain quality in engineering products.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**1-0-0**	**4**

(E322A) APPLIED THERMODYNAMICS -II

Course objectives:
The student will

1. Gain the basic knowledge of working of air standard cycles and understand the comparison with operation on actual cycles and various losses while operating engines based on actual cycles.
2. Understand the functions, types and applications of nozzles.
3. Understand different types of steam turbines working and their applications
4. Gain the knowledge on applications of reaction turbines and steam condensers
5. Gain the knowledge of gas turbine and jet propulsion application

UNIT I: Basic Concepts: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration and reheating.
Combustion: fuels and combustion, concepts of heat of reaction, adiabatic flame temperature, stoichiometry, flue gas analysis
Boilers: Classification–Working principles with sketches including H.P. Boilers–Mountings and Accessories – Boiler horse power, equivalent evaporation, efficiency and heat balance.

UNIT II: Draught: classification–Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught- induced and forced.
Steam Nozzles: Functions- types–applications; Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit, Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, effects, degree of super saturation and degree of under cooling - Wilson line.

UNIT III: Steam Turbines: Classification–Impulse turbine - Mechanical details–Velocity diagram–effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency.
De-Laval Turbine - features. Methods to reduce rotor speed, Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

UNIT IV: Reaction Turbine: Mechanical details–principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency.

Steam Condensers: Requirements of steam condensing plant–Classification of condensers– working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and affects, air pump; cooling water requirement.

UNIT V: Gas Turbines: Simple gas turbine plant–Ideal cycle, essential components– parameters of performance – actual cycle – regeneration, inter cooling and reheating – Closed and Semi-closed cycles – merits and demerits, concepts about compressors, combustion chambers and turbines of Gas Turbine Plants.

Jet Propulsion: Principle of Operation–Classification of jet propulsive engines–Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency – Turbo jet engines – Needs and Demands met by Turbo jet-Schematic Diagram, Thermodynamic Cycle, and Performance Evaluation Thrust Augmentation– Methods.

Rockets: Application–Working Principle–Classification–Propellant Type–Thrust, Propulsive Efficiency – Specific Impulse – Solid and Liquid propellant Rocket Engines.

TEXT BOOKS :

1. Thermal Engineering: R.K. Rajput, Lakshmi Publications, 3rd Edition, 2001.
2. Gas Turbines: V. Ganesan, TMH, 3rd Edition, 2002.

REFERENCES:

1. Thermodynamics and Heat Engines: R. Yadav, Central Book Depot
2. Gas Turbines and Propulsive Systems: P. Khajuria & S. P. Dubey , Dhanpatrai and sons, 1997
3. Gas Turbines: Cohen, Rogers and Saravana Muttoo, Addison Wesley, Longman Publishers.

Course Outcomes:

The student will be able to

1. Apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.
2. Identify and formulate power production based on the fundamentals laws of thermal engineering.
6. Install different types of steam turbines in the industry
3. Investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind.
4. Analyze working of gas turbine and jet propulsion system

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**1-0-0**	**4**

(E322B) DESIGN OF MACHINE MEMBERS-II

Course objectives:

The student will

1. Understand the design procedures for complete machine members under dynamic conditions by utilising the concepts of strength of materials mathematical equations and design data handbooks
2. Understand the design criteria for sliding contact and rolling contact bearings
3. Understand the design criteria for various parts of IC engines viz piston, connecting rod, crankshaft and cylinders
4. Understand the design criteria for mechanical power transmission elements viz pulleys, belts, chains and ropes
5. Understand the design criteria for Precision power transmission components viz spur gears, helical gears, bevel gears, worm gears and power screws.

UNIT I: Sliding Contact Bearings: Types of Journal bearings–Bearing construction - bearing design-bearing materials.

Rolling Contact Bearings: Types of rolling contact bearings–selection of bearing type–selection of bearing life - Design for cyclic loads and speeds – Static and dynamic loading of ball & roller bearings.

UNIT II: Design of IC Engine Parts: Connecting Rod: Thrust in connecting rod–stress due to whipping action on connecting rod ends –

Piston: - Forces acting on piston–Construction Design and proportions of piston.,

Cylinder: Cylinders and cylinder liners.

UNIT III: Spur Gear Drives: Spur gears- Load concentration factor–Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of spur gears – Estimation of centre distance, module and face width

UNIT IV: Helical and Bevel Gear Drives: Helical and Bevel gears–Load concentration factor–Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of Helical and Bevel gears – Estimation of centre distance, module and face width.

UNIT V: Design of Power Screws: Design of screw, Square ACME, Buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

Design of Worm Gears: Worm gears–Properties of worm gears–Selection of materials–Strength and wear rating of worm gears – Force analysis – Friction in worm gears- thermal considerations.

TEXT BOOKS :

1. Design of machine element / V. Bhandari TMH publications
2. Machine Design / Pandya & Shah / Charotar

REFERENCES:

1. Machine Design / P.Kannaiah / Scitech
2. Machine Design Volume II / S.Md.Jalaludeen
3. Design Data Book / PV RamanaMurti& M .Vidyasagar/ BS Publications

Course outcomes:

The student will be able to

1. Design various mechanical elements to arrive at dimensional geometry for a given loading systems and for its effective functional criteria
2. Design various types of journal bearing ball bearings and roller bearings under dynamic conditions
3. Design various parts of IC engines under the influence of dynamic and inertia forces
4. Design Power Transmission Systems associated with use of belts, chains and ropes
5. Design critical components of Power Transmission Systems under severe conditions for dynamic forces, wear theories and heavy loading systems

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(E322C) AUTOMATION IN MANUFACTURING

Professional Elective- I

Course Objectives:

The student will

1. Understand the strategies of automation and mechanical feeding mechanisms
2. Understand the principles of material handling systems and various automation techniques used in manufacturing plant
3. Design different materials handling equipment.
4. Understand the automation of material handling component.
5. Understand the concept of fundamentals of industrial controls.

UNIT I: Introduction: Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and tool changing and machine tool control transfer the automaton.

Automated flow lines: Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration

UNIT II: Analysis of Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT III: Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT IV: Automated material handling: Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.

Automated storage systems, Automated storage and retrieval systems; work in pro storage, interfacing handling and storage with manufacturing.

UNIT V: Fundamentals of Industrial controls: Review of control theory, logic controls, sensors and actuators, Data communication and LAN in Manufacturing

Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Proto typing.

TEXT BOOKS :

1. Automation, Production Systems and Computer Integrated Manufacturing : M.P. Groover 3e./PE/PHI, 2009
2. Computer Aided Manufacturing: Tien-Chien Chang, Richard A. Wysk and Hsu-Pin Wang, Pearson, 2009.

Course outcomes:

The student will be able to

1. Apply the circuit knowledge in industrial applications
2. Analyze the flow lines and implement buffer storage systems in real time industry applications
3. Outline and select the material handling equipments.
4. Apply the design procedures of material handling equipments and components.
5. Memorize fundamentals of Industrial controls and Business process Re-engineering and apply in the industry

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(E322D) REFRIGERATION AND AIR-CONDITIONING

Professional Elective - I

Course Objective:

The student will

1. Provide the basics of refrigeration cycles and performance calculations.
2. Provide the basics of air conditioning
3. Provide the knowledge on different refrigeration techniques
4. Provide the basic principles of psychrometry.
5. Develop knowledge on the different air conditioning

UNIT I: Introduction to Refrigeration: Necessity and applications–UNIT of refrigeration and C.O.P.–Mechanical Refrigeration – Types of Ideal cycles of refrigeration.
Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems– Actual air refrigeration system problems – Refrigeration needs of Aircrafts.

UNIT II: Vapour compression refrigeration:–working principle and essential components of the plant–simple Vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – Actual cycle Influence of various parameters on system performance – Use of p-h charts – numerical Problems.
Refrigerants –Desirable properties–classification refrigerants used–Nomenclature–Ozone Depletion – Global Warming.

UNIT III: Principles of Evaporators:–classification–Working Principles Expansion devices– Types–Working Principles
Vapor Absorption System –Calculation of max COP–description and working of NH3– watersystem and Li Br –water (Two shell & Four shell) System. Principle of operation Three Fluid absorption system, salient features.
Steam Jet Refrigeration System –Working Principle and Basic Components. Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube.

UNIT IV: Introduction to Air Conditioning: Psychometric Properties & Processes– Characterization of Sensible and latent heat loads –– Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, GSHF- Problems, Concept of ESHF and ADP.

UNIT V: Requirements of human comfort and concept of effective temperature- Comfort chart–Comfort Air conditioning – Requirements of Industrial air conditioning, Air conditioning Load Calculations.

Air Conditioning systems - Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers fans and blowers. Heat Pump – Heat sources – different heat pump circuits.

TEXT BOOKS :

1. Refrigeration and Air Conditioning: CP Arora, Mc Graw Hill, 1998.
2. A Course in Refrigeration and Air conditioning: SC Arora &Domkundwar, Dhanpatrai Publishers, 2009.

REFERENCES:

1. Principles of Refrigeration: Warren Marsh. R, 2nd Edition, Delmar Publications
2. Refrigeration and Air Conditioning: P.L.Bellaney, Khanna Publishers, 7th Edition, 1985.
3. Basic Refrigeration and Air-Conditioning: Ananthanarayanan, TMH.

Course outcomes:

The student will be able to

1. Understand the principles and applications of refrigeration systems
2. Understand vapor compression refrigeration system and identify methods for performance improvement
3. Study the working principles of steam jet, vapour absorption, thermoelectric and vortex tube systems
4. Analyze air conditioning processes using principle of psychometry and evaluate cooling and heating load in an air conditioning system
5. identify eco friendly refrigerants and use P-H charts to evaluate the performance

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

(E322E) UN-CONVENTIONAL MACHINING PROCESSES

Professional Elective - I

Course objectives:

The student will

1. Understand the modelling technique for machining processes
2. Apply interpretation of data for process selection
3. Know the mechanics and thermal issues associated with chip formation
4. Learn the effects of tool geometry on machining force components and surface finish
5. Understand the surface finish and material removal rate

UNIT – I: Introduction: Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection. Materials. Applications.

Ultrasonic machining –Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT – II: Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.

Electro – Chemical Processes: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, and Surface finish and accuracy economic aspects of ECM – Simple problems for estimation of metal removal rate. Fundamentals of chemical, machining, advantages and applications.

UNIT – III: Thermal Metal Removal Processes: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT – IV: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes –General Principle and application of laser beam machining–thermal features, cutting speed and accuracy of cut.

UNIT V: Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries. Chemical machining-principle- maskants –etchants-applications. Magnetic abrasive finishing, Abrasive flow finishing, Electro stream drilling, Shaped tube electrolytic machining.

TEXT BOOKS :

1. Advanced Machining Processes; VK Jain, Allied publishers, 2010.
2. Manufacturing Engineering and Technology: SeropeKalpakjian and Steven R. Schmid, 4th Edition, Pearson Publications, 2012.

REFERENCES:

1. Modern Machining Process: Pandey P.C. and Shah H.S., TMH, 1980.
2. New Technology: Bhattacharya A, The Institution of Engineers, India 1984.
3. Unconventional Machining Processes: C. Elanchezhian, B. VijayaRamnath and M Vijayan, Anuradha Publications, 2005

Course outcomes:

The student will be able to

1. Demonstrate the knowledge and ability to understand the basic techniques of machining processes
2. Demonstrate orthogonal cutting mechanics
3. Determine the thermal aspects of orthogonal cutting mechanics
4. Extend, through modeling techniques, the single point, multiple point and abrasive machining processes
5. Estimate the material removal rate and cutting force, in an industry in a useful manner, for practical machining processes

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E322F) POWER PLANT ENGINEERING

Professional Elective - II

Course objectives:

The student will

1. Gain basic knowledge of Different types of Power Plants, site selection criteria of each one of them.
2. Understand the thermal Power Plant Operation, turbine governing, different types of high pressure boilers including supercritical and supercharged boilers, Fluidized bed combustion systems. .
3. Gain basic knowledge of Different types of Nuclear power plants including Pressurized water reactor, Boiling water reactor, gas cooled reactor, liquid metal fast breeder reactor.
4. Understand the Power Plant Economics, Energy Storage including compressed air energy and pumped hydro etc.
5. Discussing environmental and safety aspects of power plant operation.

UNIT I: Introduction to the Sources of Energy – Resources and Development of Power in India. **Steam Power Plant:** Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, and ash handling systems.

Steam Power Plant: Combustion Process: Properties of coal–overfeed and under feed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT II: Internal Combustion Engine Plant: DIESEL POWER PLANT: Introduction–IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air intake system, lubrication and cooling system – super charging.

Gas Turbine Plant: Introduction–classification - construction–Layout with auxiliaries– Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparison.

Direct Energy Conversion: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT III: Hydro Electric Power Plant: Water power–Hydrological cycle / flow measurement–drainage area characteristics – Hydrographs – storage and Pondage – classification of dams and spill ways. Classification of plants – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

Power From Non-Conventional Sources: Utilization of Solar- Collectors- Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy.

UNIT IV: Nuclear Power Station: Nuclear fuel–breeding and fertile materials–Nuclear reactor–reactor operation.

Types Of Reactors: Pressurized water reactor, Boiling water reactor, sodium-graphite reactor, fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

UNIT V: Power Plant Economics and Environmental Considerations: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution control.

TEXT BOOKS :

1. Power Plant Engineering – P. C. Sharma / S.K.Kataria Pub
2. A Course in Power Plant Engineering: / Arora and S. Domkundwar.

REFERENCES:

1. A Text Book of Power Plant Engineering / Rajput / Laxmi Publications
2. Power plant Engineering/ Ramalingam/ Scietech Publishers
3. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
4. An Introduction to Power Plant Technology / G.D. Rai.
5. Power plant Engg - Elanchezhian- I.K. International Pub

Course outcomes:

The student will be able to

1. Select the suitability of site for a power plant.
2. Propose ash handling, coal handling method in a thermal power plant.
3. Explain working principle of different types of nuclear power plant.
4. Calculate load factor, capacity factor, average load and peak load on a power plant.
5. Indicate safety aspects of power plants

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E322G) TRIBOLOGY

Professional Elective -II

Course objectives:

The Student will

1. Learn the fundamentals of tribology and associated parameters applicable to bearings.
2. Understand the phenomenon of friction and theory of lubrications associated with various types of bearings.
3. Acquire knowledge on power losses due to friction and associated heat with respect to functions of bearings.
4. Learn various aspects of lubrication systems in hydro dynamic and hydro static bearings.
5. Understand the significant of auxiliary systems in hydro static bearings and its materials.

UNIT I: Study of various parameters: Viscosity, flow of fluids, viscosity and its variation, absolute and kinematic viscosity, temperature variation, viscosity index, determination of viscosity, different viscometers used

Hydrostatic lubrication: Hydrostatic step bearing, application to pivoted pad thrust bearing and other applications, hydrostatic lifts, hydrostatic squeeze films and its application to journal bearing.

UNIT II: Hydrodynamic theory of lubrication: Various theories of lubrication, petroffs equation, Reynold's equation in two dimensions -Effects of side leakage - Reynolds equation in three dimensions, Friction in sliding bearing, hydro-dynamic theory applied to journal bearing, minimum oil film thickness, oil whip and whirl anti-friction bearing.

UNIT III: Friction and power losses in journal bearings: Calibration of friction loss, friction in concentric bearings, bearing modulus, Sommer-field number, heat balance, practical consideration of journal bearing design considerations.

UNIT IV: Air lubricated bearing: Advantages and disadvantages, application to Hydrodynamic journal bearings, hydrodynamic thrust bearings. Hydrostatic thrust bearings. Hydrostatic bearing Analysis including compressibility effect. Study of current concepts of boundary friction and dry friction.

UNIT V: Types of bearing oil pads: Hydrostatic bearing wick oiled bearings, oil rings, pressure feed bearing, partial bearings -externally pressurized bearings.

Bearing materials: General requirements of bearing materials, types of bearing materials.

TEXT BOOKS :

1. Fundamentals of Tribology, Basu, SenGupta and Ahuja/PHI
2. Tribology in Industry: Sushil Kumar Srivatsava, S. Chand &Co.

REFERENCES:

1. Tribology – B.C. Majumdar

Course outcomes

The Student will be able to

1. Implement the fundamentals of tribology and associated parameters applicable to bearings.
2. Apply the principles of friction and theory of lubrications associated with various types of bearings
3. Evaluate the power losses due to friction and balancing of associated heat with respect to functions of bearings.
4. Apply the knowledge of lubrication systems in hydro dynamic and hydro static bearings
5. Introduce various auxiliary systems in hydro static bearings and adopt suitable materials.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E322H) MATERIAL TESTING

Professional Elective -II

Course objectives:

The Student will

1. Understand the concept of hardness and impact testing by various methods
2. Gets the knowledge of tension test, study its related properties on selected materials.
3. Study the effect of fatigue loading on materials
4. Learn the concepts of creep and stress ruptures of a material
5. Identify basic methods and types of NDT such as liquid penetration, magnetic particle, vediography and ultrasonic testing

UNIT I: Introduction, Importance of testing Hardness Test: Methods of hardness testing – Brinell, Vickers, Rockwell hardness tests.

The Impact Test: Notched bar impact test and its significance, Charpy and Izod Tests, fracture toughness testing - COD and CTOD tests, significance of transition temperature curve.

UNIT II: The Tension Test: Engineering stress-strain and True stress-strain curves. Tensile properties, conditions for necking. Stress-Strain diagrams for steel, Aluminum and cast iron.

UNIT III: Fatigue Test: Introduction, Stress cycles, S-N Curve, Effect of mean stress, Mechanism of fatigue failure, Effect of stress concentration, size, surface condition and environments on fatigue.

UNIT IV: Creep and Stress Rupture: Introduction, The creep curve, Stress-rupture test, Structural changes during creep, Mechanism of creep deformation, theories of creep. Fracture at elevated temperature.

UNIT V: NDT: Principle, Operation, Advantages and Limitations of Liquid Penetrant, Magnetic Particle, Radio graphy and Ultrasonic tests.

TEXT BOOKS :

1. Mechanical Metallurgy – G. E. Dieter
2. Mechanical behavior - Ed. Wulf.

REFERENCES:

1. Mechanical Metallurgy – White & Lemay.
2. Testing of Materials - A.V.K. Suryanarayana

Course outcomes

The Student will be able to

1. Analyse the experimental data of hardness and impact testing for material properties.
2. Determine the tensile behaviour of ferrous and non ferrous materials
3. Apply the concepts of fatigue failure in material characterisation.
4. Evaluate the creep and stress rupture of any material due to effect of the environment.
5. Determine various properties of a material using NDT methods

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

(E3207) FUELS & LUBRICANTS AND AUTOMOBILE ENGINEERING LAB

Course objectives:

The student will

1. Determine flash and fire point for a given liquid fuel by pensky and abel's apparatus,
2. Determine the calorific value of a given fuel.
3. Study the constructional details, functions and working of all individual automobile parts.
4. Study the constructional details of working of automobile steering system, tyres and wheels

EXPERIMENT 1 : To determine Flash and Fire point for a given liquid fuel- Pensky Marten apparatus

EXPERIMENT 2 : determine Flash and Fire point for a given liquid fuel- Abel's apparatus

EXPERIMENT 3 : To determine viscosity of given oil by Red Wood Viscometer -I

EXPERIMENT 4 : To determine Carbon Residue of given fuel

EXPERIMENT 5 : To determine Calorific Value of a given fuel/ oil

EXPERIMENT 6 : To study and prepare report on the constructional details, working and operation of the Automobile transmission systems

EXPERIMENT 7 : study and prepare report on the constructional details, working and operation of the Automotive Drive Lines and Differentials

EXPERIMENT 8 : To study and prepare report on the constructional details, working and operation of the Automotive Fuel Supply systems

EXPERIMENT 9 : To study and prepare report on the constructional details, working and operation of the Automotive Suspension System

EXPERIMENT 10 : To study and prepare report on the constructional details, working and Operation of the Automotive Brake System

EXPERIMENT 11 : To study and prepare report on the constructional details, working and operation of the Automobile steering system

EXPERIMENT 12 : To study and prepare report on the constructional details, working and operation of the Automotive Tyres and Wheels

Course outcomes:

The Student will be able to

1. Determine the flash and fire point for a given liquid fuel.
2. Determine viscosity of given oil by red wood visco meter, carbon residue and calorific value.
3. Prepare report on all parts of individual automobile parts.
4. prepare report on all parts of automobile steering system, tyres and wheels

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-0-3**	**2**

(E3208) PRODUCTION DRAWING PRACTICE

Course objectives:

The student will

1. Understand how to read a production drawing from various perspectives of Manufacturing
2. Understand the conventional representation of materials, manufacturing processes, dimensional tolerances, geometrical dimensions and tolerances
3. Understand in preparing bill of materials and process flow charts for manufacturing a given product
4. Understand in interpreting the notes furnished in the drawing in respect of surface treatment, heat treatment and other special requirements of product under manufacturing

UNIT I: Heat treatment and surface treatment symbols used on drawings. Electrical, hydraulic and pneumatic symbols – methods of indicating notes on drawings.

UNIT II: Limits and Fits: Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

UNIT III: Form and Positional Tolerances: Introduction and indication of the tolerances of form and position on drawings, deformation of runout and total runout and their indication.

UNIT IV: Surface roughness and its indication: Definitions–finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components

UNIT V: Detailed and Part drawings: Drawing of parts from assembly drawings with indications ofsize, tolerances, roughness, form and position errors etc, preparation of Bill & materials for assembly drawings and process sheet for part- drawings.

Course outcomes:

The student will be able to

1. Read a production drawing from a holistic manufacturing point of view
2. Understand the conventions of drawing practices associated in manufacturing a product
3. Understand the requirement of material and detail Parts for an assembly of

product and its manufacturing process route

4. Read a production drawing comprehensively for obtaining an end product following the instructions given thereof.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

(E3209) THERMAL ENGINEERING LAB

Course objectives:

The student will

1. Analyze the working principle of an IC Engines through Port/Valve timing diagrams
2. Evaluate the Friction test of 4 stroke diesel engine and petrol engine
3. Evaluate the performance of the Vapor compression test rig
4. Evaluate the performance of the Refrigeration test rig
5. Gain the knowledge on Boilers

EXPERIMENT 1 : I.C. Engines Valve Timing Diagram.

EXPERIMENT 2 : I.C. Engines Port Timing Diagram.

EXPERIMENT 3 : I.C. Engines Performance Test (4 Stroke Diesel engine**)**

EXPERIMENT 4 : I.C. Engines Performance Test (2 Stroke Petrol engine)

EXPERIMENT 5 : Evaluation of Engine friction by conducting Morse test on 4- stroke Multi cylinder Petrol Engine

EXPERIMENT 6 : Evaluation of Engine friction by conducting Motoring and retardation test on IC Engine

EXPERIMENT 7 : Heat Balance Sheet on IC Engine

EXPERIMENT 8 : Determination of Air-Fuel ratio and volumetric efficiency on IC Engine

EXPERIMENT 9 : Determination of Economical speed Test for fixed load on 4- stroke Engine

EXPERIMENT 10 : Determination of Optimum cooling water temperature on IC Engine

EXPERIMENT 11 : Dis-assembly and Assembly of IC Engine

EXPERIMENT 12 : Performance Test on Reciprocating Air – Compressor Test Rig

EXPERIMENT 13 : Study of Boilers

EXPERIMENT 14 : Determination of COP of Refrigeration Test Rig.

Course outcomes:

The student will be able to

1. Gain an overview of the performance of the Diesel and petrol engine
2. Analyze the performance and exhaust emissions of an IC engine
3. Evaluate the performance of the Vapor compression test rig
4. Understand the various components and functions of the Engines
5. Learn the functions and parts of Boilers

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E413A) HEAT TRANSFER

Course Objectives:

The Student will

1. Identify the important and /or possible Heat Transfer modes in any physical system.
2. Provide students with an opportunity of direct experience of doing Heat Transfer calculation so that they can understand the basics of the principles and able to make a critical assessment of industrial environment
3. Experience with practical applications of Heat Transfer.
4. Apply the energy balance equation to Heat Transfer problems to calculate the rate for Heat Transfer for all physical devices in all modes of Heat Transfer

UNIT I: Introduction: Modes and mechanisms of heat transfer–Basic laws of heat transfer–General discussion about applications of heat transfer.

Conduction Heat Transfer: Fourier rate equation–General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates.

Simplification and forms of the field equation –steady, unsteady and periodic heat transfer– Initial and boundary conditions.

UNIT II: One Dimensional Steady State Conduction Heat Transfer: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation.

One Dimensional Steady State Conduction Heat Transfer: Variable Thermal conductivity – systems with heat sources or Heat generation. Extended surface (fins) Heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to error measurement of Temperature. **One Dimensional Transient Conduction Heat Transfer:** Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Concept of Functional Body

UNIT III: Convective Heat Transfer: Classification of systems based on causation of flow, condition of flow, configuration of flow and medium of flow – Dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem and method, application for developing semi – empirical non- dimensional correlation for convection heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

Forced convection: External Flows: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer -Flat plates and Cylinders.

Internal Flows: Concepts about Hydrodynamic and Thermal Entry Lengths–Division of internal flow based on this –Use of empirical relations for Horizontal Pipe Flow and annulus flow.

UNIT IV: Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates and pipes.
Heat Transfer with Phase Change: Boiling: –Pool boiling–Regimes Calculations on 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.
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.

UNIT V: Radiation Heat Transfer: Emission characteristics and laws of black-body radiation–Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchhoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor– Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation networks.

TEXT BOOKS :

1. Heat Transfer: HOLMAN, Mc Graw Hill, 8th Edition, 2000.
2. Heat Transfer: P.K.Nag, TMH, 2002.

REFERENCES:

1. Fundamentals of Engineering Heat and Mass Transfer: R.C.SACHDEVA, New Age International, 2008, 3rd Edition.
2. Heat Transfer: Ghoshdastidar, Oxford University Press –2nd Edition
3. Heat and Mass Transfer: R.K. Rajput – S.Chand& Company Ltd., 1st Edition, 2009.

Course outcomes:

The student will be able to

1. Understand basic modes of heat transfer and compute temperature distribution in steady state and unsteady state heat conduction and heat transfer through extended surfaces.
2. Interpret and analyze free & forced convection heat transfer
3. Comprehend the phenomena and flow regimes of boiling and condensation
4. Understand the principles of radiation heat transfer
5. Apply LMTD and NTU methods to design heat exchangers.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E413B) FINITE ELEMENT METHODS

Course Objectives:

The Student will

1. Learn basic concepts and applications and other energy principles.
2. Apply the finite element formulations to structural mechanics
3. Study the numerical integration and its applications
4. Apply the finite element formulations to heat transfer problems
5. Estimate the natural frequencies and mode shapes of a free un-damped vibration system using FEM

UNIT I: Introduction to FEM: basic concepts, historical back ground, application of FEM, general description, comparison of FEM with other methods. Basic equations of elasticity, Stress – Strain and strain - displacement relations. Rayleigh- Ritz method, Weighted residual methods.

UNIT II: One Dimensional problems : Stiffness equations for a axial bar element in local co- ordinates using Potential Energy approach and Virtual energy principle - Finite element analysis of uniform, stepped and tapered bars subjected to mechanical and thermal loads - Assembly of Global stiffness matrix and load vector - Quadratic shape functions - properties of stiffness matrix.

UNIT III: Stiffness equations for a truss bar element oriented in 2D plane - Finite Element Analysis of Trusses – Plane Truss and Space Truss elements – methods of assembly.

Analysis of beams: Hermite shape functions–Element stiffness matrix–Load vector–Problems.

UNIT IV: 2-D problems: CST - Stiffness matrix and load vector - Isoparametric element representation– Shape functions – convergence requirements – Problems. Two dimensional four noded isoparametric elements - Numerical integration - Finite element modelling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements - 3-D problems – Tetrahedran element.

UNIT V: Scalar field problems: 1-D Heat conduction–1D fin elements–2D heat conduction – analysis of thin plates – Composite slabs - problems.

Dynamic Analysis: Dynamic equations–Lumped and consistent mass matrices–Eigen Values and Eigen Vectors – mode shapes – modal analysis for bars and beams.

TEXT BOOKS :

1. The finite element methods in Engineering : S.S. Rao, Elsevier, 4th edition
2. Introduction to finite elements in engineering, Tirupathi K. Chandrupatla and Ashok D. Belagundu.

REFERENCES:

1. Finite Element Methods: Alavala, PHI, 2nd Edition, 2010.
2. An Introduction to Finite Element Methods: J. N. Reddy – Mc Grawhill
3. The Finite Element Method in Engineering Science: O.C. Zienkowitz, Mc Grawhill.

Course outcomes:

The student will be able to

1. Gain knowledge on basic equations of elasticity, shear and strain displacements and their various methods to solve
2. Solve structural problems such as axially loaded members, trucks & beams using FEM
3. Formulate 2D, 3D and axi-symmetric elements and apply them to 2D, 3D problems
4. Apply the concepts of numerical integration in FE modelling
5. Solve heat transfer and vibrational problems using FEM

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413C) ROBOTICS

PROFESSIONAL ELECTIVE-III

Course Objectives:

The Student will

1. Be familiar with the automation and brief history of robot and applications.
2. Get familiar with the kinematics of robots.
3. Get knowledge about robot end effectors and their design.
4. Learn about Robot Programming methods & Languages of robot.
5. Get knowledge about various Sensors and their applications in robots.

UNIT - I: Introduction: Automation and Robotics–An over view of Robotics–classification by coordinate system and control systems - **Components of the Industrial Robotics:** Degrees of freedom – End effectors: Mechanical gripper – Magnetic – Vacuum cup and other types of grippers – General consideration on gripper selection and design.

UNIT - II: Motion Analysis: Basic rotation matrices–Composite rotation matrices–Euler Angles–Equivalent Angle and Axis – Homogeneous transformation – Problems.

Manipulator Kinematics: D-H notations - Joint coordinates and world coordinates - Forward and inverse kinematics – problems.

UNIT - III: Differential Kinematics: Differential Kinematics of planar and spherical manipulators -Jacobians – problems.

Robot Dynamics: Lagrange–Euler formulations–Newton-Euler formulations–Problems onplanar two link manipulators.

UNIT - IV: Trajectory planning: Joint space scheme–cubic polynomial fit–Avoidance of obstacles

Types of motion: Slew motion - joint interpolated motion–straight line motion–problems

UNIT - V: Robot actuators and Feedback components: Actuators: Pneumatic and Hydraulic actuators.

Electric Actuators: DC servo motors - stepper motors.

Feedback components: position sensors – potentiometers, resolvers and encoders – Velocity sensors – Tactile sensors.

Robot Application in Manufacturing: Material handling - Assembly and Inspection.

TEXT BOOKS :

1 Industrial Robotics: Groover M P, MCH Publishers, 2010.
2 Introduction to Robotic Mechanics and Control by JJ Craig, Pearson, 3rd Edition, 2001.

REFERENCES:

1 Robotics: Fu K B, McGraw Hill, 1987.
2 Robot Analysis and Intelligence: Asada and Slotine, Wiley Inter-Science.
3 Robot Dynamics & Control: Mark W. Spong and M. Vidyasagar, John Wiley & Sons (ASIA) Pvt. Ltd.

Course outcomes:

The student will be able to

1 Analyze the manipulator design including actuator, drive and sensor issues
2 Calculate the forward kinematics, inverse kinematics and Jacobian for serial and parallel robots
3 Identify different types of end effectors and sensors required for specific applications
4 Develop programming principles and languages for a robot control system
5 Discuss various applications of industrial robot systems

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413D) DESIGN FOR MANUFACTURING

PROFESSIONAL ELECTIVE-III

Course Objectives:

The Student will

1. Acquire knowledge on the various stages of a product development process
2. Develop skills for using the various tools and techniques for developing products
3. Acquire knowledge on project management techniques.
4. Understand the concepts of product architecture, industrial design and design for manufacture
5. Understand the basics of prototyping, economic analysis and project planning and execution processes

UNIT I: Introduction: Introduction: Design philosophy–Steps in Design process–General Design rules for Manufacturability – Basic principles of designing for economical production -Creativity in design.

Materials: Selection of Materials for design–Developments in Material Technology–Criteria for material selection – Material selection interrelationship with process selection – process selection charts.

UNIT II: Machining Process: Overview of various machining processes–general design rules for machining - Dimensional tolerance and surface roughness – Design for Machining ease– Redesigning of components for machining ease with suitable examples, General design recommendations for machined parts

UNIT III: Metal Casting: Appraisal of various casting processes, Selection of casting process, General design considerations for casting – casting tolerances – Use of Solidification Simulation in casting design – Product design rules for sand casting.

Metal Joining: Appraisal of various welding processes, Factors in design of weldments – General design guidelines – pre and post treatment of welds – Effects of thermal stresses in weld joints – Design of brazed joints.

UNIT IV: Forging: Design factors for Forging–Closed die forging design–parting lines of dies–Drop forging die design – General design recommendations

Extrusion, Sheet Metal Work & Plastics: Design guidelines for Extruded sections – Design principles for Punching, Blanking, Bending, Deep Drawing – Keeler Goodman Forming Limit Diagram – Component Design for Blanking.

UNIT V: Design For Assembly: General design guidelines for Manual Assembly- Development of Systematic DFA Methodology- Assembly Efficiency- Classification System for Manual handling- Classification System for Manual Insertion and Fastening- Effect of part symmetry on handling time.

TEXT BOOKS :

1 Product design for Manufacture and Assembly: Geoffrey Boothroyd, Marcel Dekker Inc. NY, 2nd Edition, 2010.

2 Product Design: Kevin Otto and Kristin Wood, Pearson Education, 2004.

REFERENCES:

1 Product design and Manufacturing: A.K Chitale and R.C Gupta ,Prentice – Hall of India, New Delhi, 2003.

Course outcomes:

The student will be able to

1. Understand the process to plan and develop products
2. Understand the process of collecting information and developing product specifications
3. Understand the concept generation, selection and testing processes
4. Understand the concepts of product architecture, industrial design and design for manufacture
5. Understand the basics of prototyping, economic analysis and project planning and execution processes

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413E) JET PROPULSION AND ROCKET ENGINEERING

PROFESSIONAL ELECTIVE-III

Course Objectives:

The Student will

1. Study the compressible flow with friction and heat transfer.
2. Know the application of normal shock in compressible flow.
3. Study the aircraft propulsion systems and rocket propulsion and its applications.

UNIT I: Elements of Gas Turbine theory-Thermo dynamic Cycles, open closed and semi-closed –parameters of performances –cycle modifications for improvement of performance.

UNIT II: Jet propulsion: Historical sketch-reaction principle–essential features of propulsion devices-Thermal Engines, Classification of –Energy flow thrust, Thrust power and propulsion efficiency-Need for Thermal Jet Engines and application.

UNIT III: Turboprop and Turbojet-1: Thermo dynamic cycles, plant layout, essential components, principles of operation –performance evaluation

Turboprop and Turbojet-II: Thrust Augmentation and Thrust reversal-Contrasting with piston Engine Propeller plant.

UNIT IV: Forging: Ramjet: Thermo dynamic Cycle, plant lay-out, essential components–principle of operation-performance evaluation –comparison among atmospheric thermal jet engines- serqujet and pulse jet, elementary treatment.

Rocket Engines: Need for, applicat**ions –**Basic principles of operation and parameter s of performance –classification ,solid and liquid propellant rocket engines ,advantages, domains of application –propellants –comparison of propulsion systems.

UNIT V: Rocket Technology-I: Flight mechanics, Application Thrust profiles, Acceleration–staging of Rockets, need for –Feed systems, injectors and expansion nozzles –Rocket heat transfer and ablative cooling.

Rocket Technology- II: Testing & instrumentation–Need for Cryogenics–Advanced propulsion Systems, elementary treatment of Electrical Nuclear and plasma Arc propulsion.

TEXT BOOKS :

1. Gas Turbines and propulsive systems: P. Khajuria & S. P. Dubey, Dhanpatrai Pub, 1997.
2. Gas Dynamics & Space Propulsion: M. C. Ramaswamy, Jaico Publishing House.

Course outcomes:

The student will be able to

1 Know the differences between compressible and incompressible flows.
2 Solve problems in Rayleigh and Fanno flow.
3 Understand the knowledge about the rocket propulsion and various propellants.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413F) COMPUTATIONAL FLUID DYNAMICS

PROFESSIONAL ELECTIVE-IV

Course Objectives:

The Student will

1. Understand the numbering system and errors in numerical techniques and representation of integers, fractions etc.
2. Impart the knowledge of governing equations for fluid flow and finite difference applications in heat conduction and convection.
3. Learn the numerical method used to solve the partial differential equation.
4. Review of equations governing fluid flow and heat transfer

UNIT I: Elementary details in numerical techniques: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition for instability, computational methods for error estimation, convergence of sequences.

UNIT II: Applied Numerical Methods: Solution of a system of simultaneous Linear Algebraic Equations, iterative schemes of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded matrices. Finite Difference Applications in Heat conduction and Convection – Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT III: Finite Differences, discretization, consistency, stability, and Fundamentals of fluid flow modeling: Introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT IV: Introduction to first order wave equation; stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme. Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, special forms of the Navier-stokes equations.

UNIT V: Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation. Finite volume method: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic

interpolation. propulsion Systems, elementary treatment of Electrical Nuclear and plasma Arc propulsion.

TEXT BOOKS :

1. Numerical heat transfer and fluid flow: Suhas V. Patankar Hemashava Publishers corporation & Mc Graw Hill.
2. Computational Fluid Flow and Heat Transfer: Muralidaran- Narosa Publications

REFERENCES:

1. Computational Fluid Dynamics: Basics with applications: John D. Anderson, Mc Graw Hill.
2. Fundamentals of Computational Fluid Dynamics: Tapan K. Sengupta, Universities Press

Course outcomes:

The student will be able to

1. Acquire the knowledge of various types of fluid flow governing equations**.**
2. Analyze the internal fluid flow phenomena of thermal fluid flow.
3. Solve the errors involved in numerical techniques

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413G) MECHANICAL VIBRATIONS

PROFESSIONAL ELECTIVE - IV

Course Objectives:

The Student will

1. Understand and appreciate the importance of vibrations in mechanical design of machine parts that operate in vibratory conditions,
2. Obtain linear vibratory models of dynamic systems with changing complexities (SDOF, MDOF),
3. Write the differential equation of motion of vibratory systems
4. Make free and forced (harmonic, periodic, non-periodic) vibration analysis of single and multi degree of freedom linear systems

UNIT I: Single degree of Freedom systems - I: Undamped and damped free vibrations; forced vibrations coulomb damping; Response to excitation; rotating unbalance and support excitation; vibration isolation and transmissibility.

UNIT II: Single degree of Freedom systems - II: Response to Non Periodic Excitations: UNIT impulse, UNIT step and UNIT Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

Vibration measuring instruments: Vibrometers, velocity meters & accelerometers

UNIT III: Two degree freedom systems: Principal modes- undamped and damped free and forced vibrations; undamped vibration absorbers.

UNIT IV: 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; Method of matrix inversion; Torsional vibrations of multi- rotor systems and geared systems; Discrete- Time systems.

UNIT V: Numerical Methods: Raleigh’s stodola's, Matrix iteration, Rayleigh- Ritz Method and Holzer's methods.

Continuous system: Free vibration of strings–longitudinal oscillations of bars- traverse vibrations of beams- Torsional vibrations of shafts.

Critical speeds of shafts: Critical speeds without and with damping, secondary critical speed.

TEXT BOOKS :

1. Elements of Vibration Analysis: Meirovitch, TMH, 2001
2. Mechanical Vibrations: G.K.Groover, 2nd Edition, 1972, NemChand Publications.

REFERENCES:

1. Mechanical Vibrations: SS Rao, Pearson, 2009, 4th Edition.
2. Mechanical Vibration: Rao V.Dukkipati& J Srinivas, PHI, 2010.
3. Mechanical Vibrations Practice and Basic Theory: V. Ram Murthy, Narosa Publishing House, New Delhi, 2000.

Course outcomes:

The student will be able to

1 Appreciate the need and importance of vibration analysis in mechanical design of machine parts that operate in vibratory conditions
2 Analyze the mathematical model of a linear vibratory system to determine its response
3 Obtain linear mathematical models of real life engineering systems
4 Use Lagrange's equations for linear and nonlinear vibratory systems

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413H) PRODUCTION PLANNING AND CONTROL

PROFESSIONAL ELECTIVE-IV

Course Objectives:

The Student will

1. Understand the meaning and objectives of PPC functions and elements of PPC, types of production and Organization of PPC department
2. Understand the concept and importance of forecasting comma types of forecasting, qualitative methods and quantitative methods
3. Understand the functions of inventory, inventory cost, EOQ models, inventory control systems (P system, Q system) study the importance of ABC analysis and VED analysis, MRP, ERP and concepts of line of balance and JIT inventory
4. Understand the routing procedures, route sheets, bills of materials, scheduling policies, standard scheduling method (job shop and floor shop
5. Understand the concepts of line balancing methods of aggregate plan, change planning, expediting and control aspects, also studying the dispatching procedures follow up, types of follow-up and applications of components in PPC

UNIT I: Introduction: Definitions – objectives of production planning and control-functions of production planning and control-elements of production control- types of production-organization of production planning and control – internal organizations department

UNIT II: Forecasting – Importance of forecasting – types of forecasting, their uses- genera principles of forecasting techniques- Qualitative methods and quantitative methods.

UNIT III: Inventory management – Functions inventory- Relevant inventory cost- ABC analysis- VED Analysis- EOQ model – Inventory control systems – P- Systems and Q – Systems Introduction to MRP And ERP, LOB(Line of balance), JIT inventory, Japanese concepts.

UNIT IV: Routing – Definition – routing procedure- Route sheets – Bill of material- factors affecting routing procedure. Schedule – definition – difference with loading. Scheduling polices – techniques, standard scheduling methods- job shop, flow shop.

UNIT V: Line balancing, aggregate planning- methods for aggregate planning- Chase planning, expediting, control aspects.

Dispatching – Activities of dispatcher- Dispatching procedure - follow up – definition –

reasons for existence of functions – types of follow up, applications of computer in production planning control.

TEXT BOOKS :

1. Production Planning and Control: M.Mahajan- Dhanpati Rai & Co, 2010.
2. Production Planning and Control: Jain & Jain – Khanna publications, 7th Edition, 2014.

REFERENCES:

1. Production Planning and Control: Text & cases, SK Mukhopadhyaya, PHI.
2. Production and operations Management: R.PanneerSelvam, PHI, 3rd Edition, 2014.
3. Operations Management: Chase, PHI

Course outcomes:

The student will be able to

1. Understand the objectives and functions of PPC, also different types of production
2. Understand the importance and types of sales forecasting and different methods used for forecasting
3. Understand the inventory management, EOQ models, ABC analysis, VED analysis, MRP. ERP, LOB, JIT principles
4. Understand What is routing, the routing procedures, route sheets , difference between scheduling and loading, standard scheduling methods
5. Understand in Obtaining concepts of line balancing, aggregate planning, dispatching follow-up expediting and control aspects

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413J) CNC TECHNOLOGIES AND RAPID PROTOTYPING

PROFESSIONAL ELECTIVE-V

Course Objectives:

The Student will

1. Generate a good understanding of RP history, its development and applications.
2. Impart knowledge on different types of RP systems, i.e., the process, advantages, limitations and applications.
3.
4. Expose the students to different types of materials used in RP systems to make best use of various RP machines.

UNIT I: Features of NC Machines:

Fundamentals of numerical control, advantage of NC systems, classification of NC systems, point to point, NC and CNC, incremental and absolute, open and closed loop systems, Features of N/C Machine Tools, design consideration of NC machine tool, methods of improving machine accuracy.

CNC Machines Elements: Machine Structure- Guide ways - feed drives-spindles – spindle bearings - measuring systems-Tool monitoring systems.

UNIT II: Tooling for CNC Machines:

Interchangeable tooling system, preset and qualified tools, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers.

Computer-Aided Programming: General information, APT programming, Examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT III: DNC Systems and Adaptive Control:

Introduction, type of DNC systems, advantages and disadvantages of DNC, adaptive control with optimization, Adaptive control with constraints, Adaptive control of machining processes like turning, grinding.

Micro Controllers: Introduction, Hardware components, I/O pins, ports, external memory, counters, timers and serial data I/O interrupts. Selection of Micro Controllers, Embedded Controllers, Applications and Programming of Micro Controllers

UNIT IV: Programming Logic Controllers (PLC's):
Introduction, Hardware components of PLC, System, basic structure, principle of operations, Programming mnemonics timers, Internal relays and counters, Applications of PLC's in CNC Machines.

UNIT V Rapid Prototyping: Working Principles, Methods, Stereo Lithography, Laser Sintering, Fused Deposition Method, Advantages, Limitations and Applications, Rapid tooling, Techniques of rapid manufacturing

TEXT BOOKS :

1. Computer Control of Manufacturing Systems: YoramKoren, Mc Graw Hill Int. 2010.
2. CAD/CAM: Michel P.Groover, TMH, 1st Edition, 2009.

REFERENCES:

1. Machining Tools Hand Book Vol 3, (Automation & Control), Manfred Weck, John Wiley and Sons, 1984.
2. Mechatronics – HMT, TMH, 2003.
3. Manufacturing Engineering and Technology, Kalpakijian, Pearson Publication, 4th Edition, 2012.

Course outcomes:
The student will be able to

1. Illustrate the fundamentals of RPT and its materials
2. Demonstrate the various RPT systems
3. Explain the reverse engineering and new technologies pertaining to RPT.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413K) PLANT LAYOUT AND MATERIAL HANDLING

PROFESSIONAL ELECTIVE-V

Course Objectives:

The Student will

1. Plan, analyze and design to improve manufacturing and services facilities.
2. Explore equipment requirements for a specific process.
3. Understand plant layout system, its types and software tools used.
4. Understand what effect process layout has on the material handling system.
5. Apply the techniques to evaluate and design material handling and storage systems.

UNIT I: Introduction- Classification of Layout, Advantages and Limitations of different layouts, Layout design procedures, Overview of the plant layout. Process layout & Product layout: Selection, specification, Implementation and follow up, comparison of product and process layout.

UNIT II: Heuristics for Plant layout — ALDEP, CORELAP, CRAFT, Group Layout, Fixed position layout-Quadratic assignment model. Branch and bound method

UNIT III: Introduction, Material Handling systems, Material Handling principles, Classification of Material Handling Equipment, Relationship of material handling to plant layout.

UNIT IV: Basic material handling system : selection , material handling methods- path , equipment , function oriented systems .Job evaluation – methods of job evaluation – simple routing objective systems – classification methods – benefits of job evaluation and limitations

Merit Rating – job evaluation vs merit rating – objectives of merit rating – method for merit rating – ranking method – paid company method – checklist method.

UNIT V: Methods to minimize cost of material handling- Maintenance of Material Handling Equipments, Safety in handling Ergonomics of Material Handling equipment. Work Study: Introduction – definition – objectives – steps in work study – Method study – definition – objectives – steps in method study. Work Measurement – purpose – types of study – allowances – standard time calculations.

TEXT BOOKS :

1. Operations Management/ PB Mahapatra/PHI.
2. Aspects of Material handling! Dr. KC Arora &Shinde/ Lakshmi Publications.

REFERENCES:

1. Facility Layout & Location an analytical approach! RL Francis/ LF Mc Linnis Jr, White/ PHI.
2. Production and Operations Management? R Panneerselvam? PHI.
3. Introduction to Material handling! Ray, Siddhartha/ New Age.
4. Plant Layout and Material Handling/RB Chowdary/Khanna Publishers.
5. Plant Maintenance and Reliability Engineering/NVS Raju/Cengage Learning.

Course outcomes:

The student will be able to

1. Design an appropriate plant layout for a plant
2. Explain the importance of proper material handling and storage techniques.
3. Understand proper material handling engineering techniques regarding hoisting and conveying equipment
4. Explain the preventative maintenance requirements for material handling equipment.
5. Explain the components of a material handling equipment inspection program

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E413I) MACHINE TOOL DESIGN
PROFESSIONAL ELECTIVE-V

Course Objectives:
The Student will

1. Implement the tool design process when designing tooling for the manufacturing of a product.
2. Apply geometric tolerance principles in the designs of tooling.
3. Evaluate and select appropriate materials for tooling applications.
4. Design, develop, evaluate cutting tools and work holders for a manufactured product.
5. Design, develop, and evaluate appropriate gauging /gauging systems to define limits and specifications of a work piece during the manufacturing process.

UNIT I: Introduction to Machine Tool Drives and Mechanisms: Introduction to the course, Working and Auxiliary Motions in Machine Tools, Kinematics of Machine Tools, Motion Transmission.

UNIT II: Regulation of Speeds and Feeds: Aim of Speed and Feed Regulation, Stepped Regulation of Speeds, Multiple Speed Motors, Ray Diagrams and Design Considerations, Design of Speed Gear Boxes, Feed Drives, Feed Box Design.

UNIT III: Design of Machine Tool Structures: Functions of Machine Tool Structures and their requirements, Design for Strength, Design for Rigidity, Materials for Machine Tool Structures, Machine Tool Constructional Features, Beds and Housings, Columns and Tables, Saddles and Carriages.

UNIT IV: Design of Guide ways, Power Screws and Spindles: Functions and Types of Guide ways, Design of Guide ways, Design of Aerostatic Slide ways, Design of Anti-Friction Guide ways, Combination Guide ways, Design of Power Screws. Design of Spindles and Spindle Supports: Functions of Spindles and Requirements, Effect of Machine Tool Compliance on Machining Accuracy, Design of Spindles, antifriction Bearings.

UNIT V Dynamics of Machine Tools: Machine Tool Elastic System, Static and Dynamic Stiffness Acceptance Test

TEXT BOOKS :

1. Operations Management/ PB Mahapatra/PHI.
2. Aspects of Material handling! Dr. KC Arora &Shinde/ Lakshmi Publications.

REFERENCES:

1. Design of Machine Tools / D. K Pal, S. K. Basu / Oxford
2. Machine Tool Design, Vol. I, II, III and IV / N. S. Acherkhan / MIR

Course outcomes:

The student will be able to

1. Understand basic motions involved in a machine tool.
2. Design machine tool structures.
3. Design and analyze systems for specified speeds and feeds.
4. Select subsystems for achieving high accuracy in machining.
5. Understand control strategies for machine tool operations.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - I Semester	**0**	**0-3-0**	**2**

(E4105) HEAT TRANSFER LAB

Course Objectives:

The Student will

1. Impart experimental experience in Heat Transfer Lab those support Mechanical Engineering.
2. Provide students with an opportunity of direct experience of doing Heat Transfer Lab calculation so that they can understand the basics of the principles and able to make a critical assessment of industrial environment
3. Learn fundamentals in element of Heat Transfer & its applications. So as to identify, formulate and solve the problems of Heat Transfer device designs.
4. Develop an idea about how to measure heat transfer coefficients/constant like h, emissivity, Stefan Boltzmann constants for devices like metal rod, lagged pipe, etc.,
5. Encourage the students to understand importance energy conversation and make them to experience with practical applications in Heat Transfer Lab

EXPERIMENTS 1: Composite Slab Apparatus – Overall heat transfer co-efficient.

EXPERIMENTS 2: Heat transfer through lagged pipe.

EXPERIMENTS 3: Heat Transfer through a Concentric Sphere

EXPERIMENTS 4 : Thermal Conductivity of given metal rod.

EXPERIMENTS 5 : Heat transfer in pin-fin Apparatus

EXPERIMENTS 6: Experiment on Transient Heat Conduction.

EXPERIMENTS 7: Heat transfer in forced convection apparatus.

EXPERIMENTS 8: Heat transfer in natural convection

EXPERIMENTS 9: Parallel and counter flow heat exchanger.

EXPERIMENTS 10: Emissive apparatus.

EXPERIMENTS 11: Stefan Boltzman Apparatus.

EXPERIMENTS 12: Critical Heat flux apparatus

EXPERIMENTS 13: Study of heat pipe and its demonstration.

Course outcomes:

The student will be able to

1. Apply the knowledge of heat transfer to perform experiments related to conduction heat transfer
2. Evaluate heat transfer coefficient in free and forced convection heat transfer situation
3. Determine fin efficiency and emissivity in respective experiments
4. Observe the phenomena of drop and film wise condensation
5. Evaluate the performance of heat exchangers in parallel & counter flow types

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - II Semester	**4**	**1-0-0**	**4**

(E423A) CAD/CAM

Course Objectives:

The Student will

1. Understand the basic fundamentals and how computers are used in design and manufacturing
2. Learn 2D &3D transformations like reflection, rotation etc.
3. Understand the different geometric modeling techniques like solid modeling, surface modeling, and feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication.
4. Learn the part programming, importance of group technology; computer aided process planning, computer aided quality control.
5. Learn the overall configuration and elements of computer integrated manufacturing systems

UNIT I: Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT II: Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired. **Drafting and Modeling systems:** Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT III: Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center

CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT IV: Group Tech: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

Computer aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with

CAD/CAM.

UNIT V: Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOKS :

1. CAD / CAM: A Zimmers & P.Groover, PE, PHI, 1st Edition, 2009.
2. CAD / CAM Theory and Practice: Ibrahim Zeid, TMH, 3rd Edition, 2001.

REFERENCES:

1. Automation, Production systems & Computer integrated Manufacturing, Groover, Pearson Education, 2014.
2. CAD / CAM / CIM: Radhakrishnan and Subramanian: New Age, 2nd Edition, 2000.
3. Principles of Computer Aided Design and Manufacturing, FaridAmirouche Pearson.

Course outcomes:

The student will be able to

1. Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix.
2. Describe the use of GT and CAPP for the product development.
3. identify the various elements and their activities in the Computer Integrated Manufacturing Systems
4. Create accurate and precise geometry of complex engineering systems and use the geometric models in different engineering applications
5. Extend CAD/CAM technology for research and development purposes, for example by developing CAD/CAM application.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech. ME	**L**	**T-P-D**	**C**
IV Year - II Semester	**0**	**0-3-0**	**2**

(E4207) CAD/CAM LAB

Course Objectives:

The Student will

1. Learn the software's and equipments associated with CAD/CAM
2. Able to build their basic concepts about CAD/CAM
3. Learn the following using different CNC Machine's

    a) Basic working principal & Axis movements
    b) G & M code Development
    c) Programming and Test run of Programmed part

EXPERIMENT 1: Drafting: Development of part drawings for various components in the form of orthographic and isometric projections. Representation of dimensioning and tolerances.

EXPERIMENT 2: Part Modeling: Generation of various 3D Models through Extrusion, Revolve and Sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling and Assembly Modeling. Design of simple components.

EXPERIMENT 3: Exercises using Finite Element Analysis for the following.

a) Structural Analysis.
b) Thermal Analysis.
c) Dynamic Analysis.

EXPERIMENT 4: a). Development of CNC part program for Turning and Milling components.

b). Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package.

Course outcomes:

The student will be able to:

1. Design a part or assembly of parts using Computer-Aided Design software.
2. Apply top-down design principles to model a design.
3. Write the program for machining a product using CNC

Open Elective - I

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

DISASTER MANAGEMENT
(Open Elective – I)

Course Objectives:

The students will :

1. To provide basic conceptual understanding the difference between the hazard and a disaster.
2. To gain knowledge about the various disasters and their impacts.
3. To provide basic understanding about the hazard and vulnerability profile of India.
4. To have conceptual understanding about the disaster management phases.
5. To gain approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

UNIT - I:

Concept of Disaster, Different approaches, Concept of Risk, Levels of Disasters, Disaster Phenomena and Events (Global, national and regional) ,Hazards and Vulnerability, Natural and man-made hazards, response time, frequency and forewarning levels of different hazards, Characteristics and damage potential or natural hazards, hazard assessment ,Dimensions of vulnerability factors, vulnerability assessment Vulnerability and disaster risk ,Vulnerabilities to flood and earthquake hazards.

UNIT II:

Disaster Management Mechanism, Concepts of risk management and crisis managements. Disaster Management Cycle, Response and Recovery Development, Prevention, Mitigation and Preparedness ,Planning for Relief.

UNIT - III:

Capacity Building: Concept, Structural and Non-structural Measures ,Capacity Assessment; Strengthening Capacity for Risk reduction ,Counter-Disaster Resources and their utility in Disaster Management ,Legislative Support at the state and national levels.

UNIT - IV:

Coping with Disaster, Coping Strategies; alternative adjustment processes, Changing Concepts of disaster management ,Industrial Safety Plan; Safety norms and survival kits, Mass media and disaster management.

UNIT - V:

Planning for disaster management, Strategies for disaster management planning, Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy in India. Organizational structure for disaster management in India, Preparation of state and district disaster management plans .

TEXT BOOKS:

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

REFERENCES:

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.

Course Outcomes:

The Students will be to

1. acquired knowledge on various types of disasters and hazards.
2. distinguish between the hazard and a disaster can be analyzed.
3. acquired knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. ability to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
5. develop ability to respond to different disasters.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

Elements of Civil Engineering
(Open Elective-I)

Course Objectives:

The students will:

1. To understand different methods of surveying for various applications.
2. To familiarize with various types of building materials.
3. To understand transportation and traffic management.
4. The knowledge of water sources, supply& its treatment.
5. Study about Highway development in India, Necessity for Highway planning, different road development plans..

UNIT - I:

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT II:

Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying –introduction, chain and compass traversing, closing error and adjustments. Levelling– introduction, types of levelling instruments, dumpy level, adjustment of level, levelling staff.

UNIT - III:

Building Materials and Construction

Materials: Introduction to construction materials like ferrous and non ferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. Construction: Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT - IV:

Fire and Earthquake Protection in Building Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials, fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT - V:

Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

Highway Engineering:

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

TEXT BOOKS:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

Course Outcomes:

Students will be able to

1. Carry out simple land survey and prepare maps showing the existing details.
2. Find out area of irregular shaped plane areas.
3. Understand building plan, elevation and section.
4. Get acquainted with construction materials and transportation systems.
5. Understand transportation and traffic problems.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year – I Semester	**3**	**0-0-0**	**3**

Network Analysis and Synthesis
(Open Elective - I)

UNIT I:
Concept of generalized frequency, circuit representation and their response in terms of generalized frequency.

UNIT II:
Fourier transforms and series, Laplace transform, its properties, and Z transforms, its properties and applications, Concept of one port, two-port networks, characteristics and parameters.

UNIT III:
Generalized network functions (Driving point and Transfer), concepts of poles and zeros, determination of free and forced response from poles and zeros, concept of minimum phase networks, analysis of ladder, lattice, T and bridged-T networks.

UNIT IV:
Introduction to state-space representation of networks and their analysis. Concept of filtering, filter types and characteristics, classical design of T and PI passive filters, frequency transformations. Introduction to active filters, active filter specifications, design of first and second order RC –active filters, maximally flat and equi-ripple filter characteristics, implementation using passive elements and op-amps.

UNIT V:
Network synthesis- Synthesis problem formulation, properties of positive real functions, Hurwitz polynomials, properties of RC, LC and RL driving point functions, Foster and Cauer synthesis of LC and RC circuits.

Text Books:

1. Temes & LaPatra – Introduction to circuit Synthesis & Design, McGraw Hill.
2. V. Valkenberg – Modern Network Synthesis, PHI.

Reference Books:

1. Weinberg – Network Analysis & Synthesis, McGraw Hill.
2. Peikari – Fundamentals of Network Analysis & Synthesis, Wiley.
3. V. Atre-- Network Theory and Filter design, TMH.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year – I Semester	**3**	**0-0-0**	**3**

Measurements and Instruments

(Open Elective - I)

UNIT - I:

Philosophy Of Measurement- Methods of Measurement, Measurement System, Classification of instrument system, Characteristics of instruments & measurement system, Errors in measurement & its analysis, Standards.

Analog Measurement of Electrical Quantities –Electrodynamics , Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters , Electrodynamics' Wattmeter, Three Phase Wattmeter, Power in three phase system , errors & remedies in wattmeter and energy meter. Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed , frequency and power factor.

UNIT - II:

Measurement of Parameters- Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q Meter.

AC Potentiometer- Polar type & Co-ordinate type AC potentiometers , application of AC Potentiometers in electrical measurement.

UNIT - III:

Magnetic Measurement- Ballistic Galvanometer, flux meter , determination of hysteresis loop, measurement of iron losses

UNIT - IV:

Digital Measurement of Electrical Quantities- Concept of digital measurement, block diagram Study of digital voltmeter, frequency meter Power Analyzer and Harmonics Analyzer; Electronic Multimeter.

UNIT - V:

Cathode Ray Oscilloscope - Basic CRO circuit (Block Diagram),Cathode ray tube (CRT) & its components , application of CRO in measurement ,Lissajous Pattern.; Dual Trace & Dua Beam Oscilloscopes.

Text Books:

1. E.W. Golding & F.C. Widdis, - Electrical Measurement &Measuring Instrument‖, A.H. Wheeler& Co. India.
2. A.K. Sawhney, -Electrical & Electronic Measurement & Instrument‖, Dhanpat Rai & Sons

Reference Books:

1. Forest K. Harries,—Electrical Measurement, Willey Eastern Pvt. Ltd. India .
2. M.B. Stout ,—Basic Electrical Measurement‖ Prentice hall of India.
3. W.D. Cooper,‖ Electronic Instrument & Measurement Technique — Prentice Hall International.
4. Rajendra Prashad ,—Electrical Measurement &Measuring Instrument‖ Khanna Publisher.
5. J.B. Gupta, -Electrical Measurements and Measuring Instruments‖, S.K. Kataria & Sons.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

AUTOMOBILE ENGINEERING
(OPEN ELECTIVE-I)

UNIT – I: Introduction : Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarburization, Nitriding of crank shaft. Emission from Automobiles – Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.

UNIT – II: Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – carburetor – types – air filters – petrol injection. Electronic injection system
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.

UNIT – III: Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.
Ignition System : Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

UNIT – IV: Electrical System : Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc
Transmission System : Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter.Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles– types – wheels and tyres.

UNIT – V: 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.
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, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXT BOOKS :

1. Automobile Engineering ,Vol. 1 & Vol. 2/ Kripal Singh
2. Automobile Engineering , Vol. 1 & Vol. 2 ,by K.M Gupta,Umesh publication
3. Automobile Engineering - K.K.Ramalingam –scitech lab

REFERENCE BOOKS :

1. A System approach to Automotive Technology by Jack Erjavec YesDee publishing pvt Ltd.
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Alternative fuels of Automobiles by P.RamiReddy, Frontline publications.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

ENGINEERING MATERIALS AND FABRICATION PROCESSES

(OPEN ELECTIVE – I)

UNIT-I: FERROUS ALLOYS: Introduction, Designations and classifications for steels, Simple Heat Treatments, Effect of Alloying Elements.

NONFERROUS ALLOYS: Introduction, properties and applications, Aluminum Alloys, Magnesium Alloys, Copper Alloys and Titanium Alloys.

CERAMIC MATERIALS: Introduction, Properties and Applications of Ceramics, Glasses and Refractories

POLYMERS: Introduction, Classification of Polymers, Polymerization, Degree of Polymerization, Typical Thermoplastics and Thermosets.

COMPOSITES: Introduction, Classification, Properties and Applications of Polymer matrix, Metal Matrix Ceramic Matrix and Laminar composites.

UNIT-II: Casting : Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.

Methods of Melting - Crucible melting and cupola operation – Defects in castings;

Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.

UNIT-III: Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

Inert Gas Welding _ TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT-IV: Hot working, cold working, strain hardening, recovery, re-crystallization and grain growth. Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT-V: Extrusion of Metals : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

TEXT BOOKS:

1. Donald R. Askland, Pradeep P. Phule, The Science and Engineering of Materials (4th Edition), Thomson Publishers, 2003.
2. William D. Callister Introduction to Material Science and Engineering, John Wiley and Sons, 2007.
3. W.F.Smith, Principles of Materials Science and Engineering, Mc Graw Hill, New York, 1994.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

Principles of Electronic Communications
(OPEN ELECTIVE – I)

Course objectives: The Student will

1. gain knowledge about modulation and various analog modulation schemes.
2. have a broad understanding of Pulse modulation schemes.
3. obtain knowledge on Digital modulation techniques.
4. illustrate the wireless networking concepts.
5. understand the principle of cellular mobile radio systems.

Unit I: Introduction
Block diagram of Electrical communication system, Radio communication, Types of communications: Analog, pulse and digital. Analog Modulation: Need for modulation, Types of Analog modulation, Amplitude Modulation.
Angle Modulation: Frequency & Phase modulations. Generation and Demodulation techniques. Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

Unit II: Pulse Modulations
Sampling, Nyquist rate of sampling, sampling theorem for Band limited signals, PAM, regeneration of base band signal.
PWM and PPM, Time Divison Multiplexing, Frequency Divison Multiplexing, Asynchronous Multiplexing.

Unit III: Digital Communication
Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.
Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, offset and non-offset QPSK, coherent and incoherent reception, Modems.

Unit IV: Introduction to Wireless Networking
Introduction, Difference between wireless and fixed telephone networks,
Development of wireless networks, Traffic routing in wireless networks.

Unit V: Cellular Mobile Radio Systems
Introduction to Cellular Mobile System, concept of frequency reuse, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems, Cell splitting.
Handoffs and Dropped Calls Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem

handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.

TEXT BOOKS:

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002,PHI.

REFERENCE BOOKS:

1. Wireless Communication and Networking – William Stallings, 2003, PHI.
2. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
3. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2ndEd. 2004.

Course outcomes: The Student will be able to

1. acquire knowledge about analog and angle modulation techniques.
2. illustrate the concepts of Pulse modulation schemes.
3. obtain knowledge on Digital modulation techniques.
4. describe the wireless networking concepts.
5. understand the basics of cellular mobile radio systems and types of handoff.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year I Semester	**3**	**0-0-0**	**3**

MATLAB PROGRAMMING

(Open Elective-I)

Course objectives: The Student will

1. gain knowledge in exploring MATLAB software.
2. be able to find approach for solving Engineering problems using simulation tools.
3. be prepared to use MATLAB in their project works.
4. gain a foundation in use of this software for real time applications.
5. practice numerical methods, simulations and understand MATLAB programming.

UNIT-I: MATLAB basics, The MATLAB Environment, Basic computer programming, Variables and constants, operators and simple calculations, Formulas and functions, MATLAB toolboxes, Exercises.

UNIT-II: Matricers and vectors, Matrix and linear algebra review, vectors and matrices in MATLAB.

Matrix operations and function in MATLAB, Exercises**.**

UNIT-III: Computer programming, Algorithms and structures, MATLAB scripts and functions (m-files).

Simple sequential algorithms, control structures (if…then, loop), Exercises.

UNIT-IV: MATLAB programming, Reading and writing data, file handling, personalized functions.

Toolbox structure, MATLAB graphic functions, Exercises.

UNIT-V: Numerical simulations-Numerical methods and simulations, Random number generation, Montecarlo methods statistics Toolbox, User‘s Guide: Random Number and Generation Functions).

Hands-on session

Interactive hands-on-session where the whole class will develop one or more MATLAB scripts that solve an assigned problem.

TEXT BOOK:

1. MATLAB Programming by Y.Kirani Singh, B.B Chowdari , PHI publications, 2007 edition.
2. MATLAB And Its Applications In Engineering By Rajkumar Bansal , Ashok Kumar Goel, Manoj Kumar Sharma, Pearson Education Publications, version 7.5.

REFERENCE BOOKS:

1. Getting Started With MATLAB By Rudrapratap, Oxford Publication, 2002 Edition.

Course outcomes: The Student will be able to

1. develop programming and simulation for engineering problems.
2. estimate importance of software’s in research by simulation work.
3. prepare basic mathematical, electrical, electronic problems in MATLAB.
4. synthesis basic electronic circuits in simulink.
5. interpret programming files with GUI Simulink.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year I Semester	**3**	**0-0-0**	**3**

DATA STRUCTURES THROUGH C
(Open Elective-I)

Course Objectives:

The Student will:

1. Review the basic concepts of data structures and algorithms.
2. Classify basic concepts of stacks, queues.
3. Understanding searching and sorting techniques.
4. Classify basic concepts about stacks, queues ,lists ,trees and graphs.
5. Know step by step approach in solving problems with the help of fundamental data structures.

UNIT - I:

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT - II:

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation. Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue

UNIT - III:

Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

UNIT - IV:

Graphs: Terminology, sequential and linked representation, graph traversals : Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

UNIT - V:

Searching and Sorting – Big O Notation, Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, Searching-linear and binary search methods.

Text Books:

1. **Data Structures Using C** Reema Thareja, Oxford University Press, 2011 Learning.
2. **Data Structures Using C** (Paperback) by Aaron M. Tenenbaum

Reference Books:

1. **C Programming & Data Structures**, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage
2. **C& Data structures** – P. Padmanabham, Third Edition, B.S. Publications.
3. **Data Structures using C** – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education

Course Outcomes:

The student will be able to:

1. Analyze algorithms and algorithm correctness.
2. Apply searching and sorting techniques.
3. Practice stack, queue and linked list operation.
4. Relate tree and graphs concepts.
5. Relates graphs concepts with traversals.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year I Semester	**3**	**0-0-0**	**3**

PYTHON PROGRAMMING
(Open Elective-I)

Course objectives:
Student will:

1. Learn how to design and program Python applications.
2. Learn how to use lists, tuples, and dictionaries in Python programs.
3. Learn how to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Learn how to build and package Python modules for reusability, design object oriented programs with Python classes,use class inheritance in Python for reusability.
5. Learn how to use exception handling in Python applications for error handling

UNIT - I:
Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

UNIT - II:
Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries
Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples
Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

UNIT - III:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, attributes, instances as arguments, instances as return values, objects are mutable, copying; classes and functions: pure function, modifiers; Exceptions: raising exceptions, handling exceptions, exception hierarchy.

UNIT - IV:

Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism. Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem, different sets of arguments.

UNIT - V:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;
Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Text Books:

1. **Python 3 Object Oriented Programming,** Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language- Second Edition, Mark Summerfiels, Addison-Wesley 2010.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

Course outcomes:

Students will abel to:

1. Describe to design and program Python applications.
2. Analyze and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Apply decision for building and package Python modules for reusability, design object-oriented programs with Python classes, use class inheritance in Python for reusability.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

E-DISASTER MANAGEMENT

(OPEN ELECTIVE-I**)**

Course Objectives

At the end of the course, students will :

1. Explain various disasters and their impacts.
2. Describe storage networking technologies such as FC-SAN, NAS, IP-SAN and data archival solution – CAS.
3. Identify different storage virtualization technologies and their benefits.
4. Understand and articulate business continuity solutions including, backup technologies, and local and remote replication.
5. Identify parameters of managing and monitoring storage infrastructure and describe common storage management activities and solutions.

UNIT-I:

Introduction to Disasters; Examples; Information Availability, Causes of Information Unavailability, Measuring Information Availability.

Consequences of Downtime; Failure Analysis, Single Point of Failure, Fault Tolerance, Multi pathing Software.

UNIT-II:

Backup and Recovery: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations.

Backup Methods, Backup Process Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNIT-III:

Local Replication: Source and Target, Uses of Local Replica, Data Consistency, Local Replication Technologies, Restore and Restart Considerations Creating Multiple Replicas, Management. Interface.

Remote Replication: Modes of Remote Replication, Remote Replication Technologies Network Infrastructure.

UNIT-IV:

Securing the Storage Infrastructure, Storage Security Framework, Risk Triad, Assets, Threats, Vulnerability. Storage Security Domains, Securing the Application Access Domain. Securing the Management Access Domain, Securing Backup, Recovery, and Archive (BURA), Security Implementations in Storage Networking SAN , NAS, IP SAN.

UNIT-V:

Monitoring the Storage Infrastructure: Parameters Monitored, Components Monitored, Monitoring Examples, Alerts, Storage Management Activities, Availability management, Capacity management, Performance management, Security Management.

Reporting, Storage Management Examples, Storage Infrastructure Management Challenges, Developing an Ideal, Solution, Storage Management Initiative, Enterprise Management Platforms.

TEXT BOOK:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information**,** Ganesh Rajaratnam**,** EMC Education Services. Wiley Publications.
2. Executive Guide to Preventing Information Technology Disasters By Richard Ennals. Springer.

REFERENCE BOOKS:

1. Information Management & Computer Security, Port Elizabeth Technikon, Port Elizabeth, MCB UPLtd.
2. Information Security Management Systems, GodesbergerAllee,BSI.

Course Outcomes

At the end of the course , students will be able to:

1. Apply important storage technologies and their features such as availability,replication, scalability andperformance.
2. Show employs project teams to install, administer and upgrade popularstorage solutions.
3. Illustrate virtual servers and storage between remotelocations.
4. Use the knowledge of Disaster ManagementPhases.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

HUMAN COMPUTER INTERACTION

(OPEN ELECTIVE-I)

Course Objectives

At the end of the course , students will :

1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Recognize how a computer system may be modified to include human diversity.
3. Select an effective style for a specific application.
4. Design mock ups and carry out user and expert evaluation of interfaces

UNIT I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III

Screen Designing: - Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls Components – text and messages, Icons and increases – Multimedia,
colors, uses problems, choosing colors.

UNIT V

Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOK:

1. The essential guide to user interface design, Wilbert O Galitz, WileyDreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson EducationAsia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, RussellBealg,PearsonEducation
2. Interaction Design Prece, Rogers, Sharps. WileyDreamtech.
3. User Interface Design, Soren Lauesen , PearsonEducation.
4. Human –Computer Interaction,D.R.Olsen,Cengage Learning.

Course Outcomes

At the end of the course , students will be able to:

1. Explain the human, Computer components functions regarding interaction with computer
2. Demonstrate Understanding of Interaction between the human and computer Components.
3. Use Paradigms, HCI in the software process.
4. Implement Interaction design basics**.**

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS

(OPEN ELECTIVE-I)

Course Objectives:
At the end of the course, students will learn:

1. Study the Architecture of 8085&8086 microprocessor
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. Study the Architecture of 8051 microcontroller
4. Make the interfacing in between microprocessor and various peripherals.
5. Know basic feature of 8051 and AVR controller.

UNIT–I:

8086 Architecture:8086 Architecture Functional diagrams, Register organization, memory segmentation, programming model, memory addresses, physical memory organization, architecture of 8086,signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

UNIT–II:

Instruction set and assembly language programming of 8086: Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT–III:

I/O Interface: 8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.
Interfacing with advanced devices: memory interfacing to 8086, interrupt structure of 8086, vector interrupt table, interrupt service routine.
Communication interface: serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

UNIT–IV:

Introduction to Microcontrollers: overview of 8051 microcontroller, architecture, I/O ports, memory organization, addressing modes and instruction set of 8051, simple programs.

UNIT-V:

8051 Real Time control: programming time interrupts, programming external hardware interrupts, Programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1. D.V.Hall, Microprocessors and interfacing,TMGH,2nd Edition 2006.
2. Kenneth.J.Ayala, The8051Microcontroler,3rdEd., C engage Learning.

References:

1. Advanced Microprocessors and Peripherals-A. K. Rayand K.M Bhurchandi, TMH, 2nd Edition 2006.
2. The 8051Microcontrollers.Architecture and programming and applications-K.Uma Rao, Andhe Pallavi,Pearson, 2009.
3. Microcomputer system 8086/8088 family architecture. Programming and design-Du and GA Gibson, PHI 2nd Edition.

Course Outcomes:

At the end of the course, students will be able to:

1. Design and implement programs on 8085 microprocessors.
2. Design and implement programs on 8086 microprocessors.
3. Design interfacing circuits with 8086.
4. Design and implement 8051 microcontroller based systems
5. Understand the concepts related to I/O and memory interfacing

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

INTERNET OF THINGS
(OPEN ELECTIVE – I)

Course Objectives:

At the end of the course, students will learn:

1. Explore the interconnection and integration of the physical world and the cyberspace.
2. Able to design and develop IOT Device.
3. Explore the terminology, technology and its applications
4. Understand the concept of M2M (machine to machine) with necessary protocols.
5. To introduce the Python Scripting Language which is used in many IoT devices

UNIT–I:

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT–II:

Domain Specific IoT – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

IoT and M2M –Difference between IoT and M2M, SDN, NFV, Difference between SDN and NFV.

UNIT–III:

Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT–IV:

Network & Communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

UNIT-V:

Challenges in IoT

Design challenges, Development challenges, Security challenges, other challenges

Domain specific applications of IoT

Home automation, Industry applications, Surveillance applications, Other IoT applications

Text Books:

1. Internet of Things – A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the application areas of IOT
2. Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
3. Building blocks of Internet of Things and characteristics.
4. Design and implementation/modification of methods involved in IoT.
5. Describe what IoT is and the skill sets needed to be a network analysis.

Open Elective - II

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

ESTIMATION, QUANTITY SURVEY & VALUATION
(Open Elective-II)

Course Objective

The main objective of the course is to

1. Understand how to estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project
2. Estimate the detailed quantities of various items of work and their rates in building projects.
3. Estimate the quantities of works and evaluate cost of project.
4. Understand and apply the concept of Valuation for Properties
5. Understand, Apply and Create the Tender and Contract document.

UNIT - I:

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating

UNIT II:

Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT - III:

Earthwork for roads and canals.

UNIT - IV:

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT - V:

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standard specifications for different items of building construction.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

WASTE MANAGEMENT
(Open Elective-II)

Course Objectives:

1. To learn about Solid Waste management
2. To describe the collection, treatment and disposal methods of Solid waste

UNIT - I:

Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics-Problems due to improper disposal of solid waste.

UNIT II:

Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT - III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid Waste-Processing and segregation of the solid waste- various methods of material segregation.

Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition methods of composting-advantages of composting- Incineration: definition methods of incineration advantages and disadvantages of incineration.

UNIT - IV: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification Design and Operation of landfills, Land Farming, Deep well injection.

UNIT - V: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Reference Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

Course Outcomes:

Students will be able to

1. Identify the types and sources of solid waste, and its characteristics.
2. Employ the treatment and disposal methods of solid waste.
3. Apply the concepts of solid waste management.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year – II Semester	**3**	**0-0-0**	**3**

NON-CONVENTIONAL ENERGY SOURCES AND APPLICATIONS

(Open Elective - II)

UNIT-I:

Introduction: Limitations of conventional energy sources, need and growth of alternate energy sources, basic schemes and applications of direct energy conversion.

MHD Generators: Basic principles and Hall Effect, generator and motor effect, different types of MHD generators, conversion effectiveness. Practical MHD generators, applications and economic aspects.

UNIT-II:

Solar Energy: Photovoltaic effect, characteristics of photovoltaic cells, conversion efficiency, solar batteries and applications. Solar energy in India, solar collectors, solar furnaces & applications.

UNIT-III:

Thermo-electric Generators: See back effect, peltier effect, Thomson effect, thermoelectric convertors, brief description of the construction of thermoelectric generators, applications and economic aspects.

Fuel Cells: Principle of action, gibbs free energy, general description of fuel cells, types, construction, operational characteristics and applications.

UNIT-IV:

Miscellaneous Sources: Geothermal system, characteristics of geothermal resources, choice of generators, electric equipment and precautions. Low head hydro plants, definition of lowhead hydro power, choice of site and turbines. Tidal energy, idea of tidal energy, tidal electric generator, limitations.

UNIT-V:

8051 Real Time control:

Programming time interrupts, programming external hardware interrupts, and programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1 D.S.Chauhan, „Non Conventional Energy Resources" New Age Publication

2. G.D. Rai, „Non-conventional energy sources", Khanna Publishers

Reference Books:

1. B.H.Khan, „Non Conventional Energy Resources" TMH.
2. H.P.Garg and Jai Prakash, „Solar Energy Fundamentals and Applications", TMH

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year – II Semester	**3**	**0-0-0**	**3**

Electrical Technology
(Open Elective - II)

UNIT - I:
D.C Generators and DC Motors:
Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators, DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT - II:
Transformers & Performance:
Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit, Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT - III:
Three Phase Induction Motor:
Principle of operation of three-phase induction motors –Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT - IV:
Alternators:
Alternators – Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT - V:
Special Motors & Electrical Instruments:
Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics, Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters).

Text Books:

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering - T.K. Nagasarkar and M. S. Sukhija, Oxford University Press, 2005

Reference Books:

1. Principles of Electrical Engineering - V.K Mehta, S. Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarath and D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

OPERATIONS RESEARCH
(Open Elective-II)

UNIT I: Introduction - Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.
ALLOCATION: Linear Programming Problem - Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two–phase method, Big-M method; Duality Principle.

UNIT II: TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.
Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem.

UNIT III: SEQUENCING – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines
REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely-Group Replacement.
UNIT IV: THEORY OF GAMES: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games –m x 2 & 2 x n games - graphical method – m x n games - dominance principle.
INVENTORY: Introduction – Single item, Deterministic models – Types - Purchase inventory models with one price break and multiple price breaks – inventory models with and without shortage cost. Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

UNIT V: WAITING LINES: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.
DYNAMIC PROGRAMMING:
Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming- shortest path problem – linear programming problem.
SIMULATION:- Definition – types of simulation models- applications ,advantages and disadvantage. Brief introduction of simulation languages – inventory and queuing problems using random numbers

TEXT BOOKS :

1. Operation Research /J.K.Sharma/MacMilan.
2. Operations Research / ACS Kumar/ Yesdee

REFERENCES:

1. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspan and Lawrence Friedman
2. Operations Research /A.M.Natarajan, P. Balasubramaniam, A. Tamilarasi/Pearson Education
3. Operations Research / Wagner/ PHI Publications.
4. Introduction to O.R/Hillier & Libermann (TMH).

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

NANOTECHNOLOGY

(Open Elective **–II)**

UNIT I: Introduction to nanotechnology: Importance of nano scale, Nanostructure types, electronic, magnetic, optical Properties of Nano materials, top-down and bottom- up approach to nanostructures.

Quantum Mechanical phenomenon in nanostructures: Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

UNIT II: Carbon Nano Structures: Carbon nano tubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, Properties (mechanical, optical and electrical) and applications.

Fabrication of Nano materials: Physical Methods: Inert gas condensation, Arc discharge, RF plasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser pyrolysis, Molecular beam epitaxy, Chemical vapour deposition method.

UNIT III: Nano scale characterization techniques: Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD

Nano devices and Nano medicine: Lab on chip for bioanalysis, Core/shell Nanoparticles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

UNIT IV: Nano and molecular electronics: Resonant-Tunneling structures, single electron tunneling, Single Electron transistors, coulomb blockade, giant magneto resistance, tunneling magneto resistance.

UNIT V: Nanolithography and Nano manipulation: e-beam lithography and SEM based nanolithography and nano manipulation, Ion beam lithography, oxidation and metallization. Mask and its application. Deep UV lithography, X-ray based lithography.

TEXT BOOKS :

1. Introduction to Nanotechnology: Charles.P.Pode, Springer Publications, 2008.
2. Springer Handbook of Nanotechnology: Bharat Bhusan, Springer Publications, 2010.

REFERENCES:

1. Principles of Nanotechnology: Phani Kumar, Scitech Publications.
2. Transport in Nano structures: David Ferry, Cambridge University Press 2000
3. Nano-biotechnology; C.M. Niemeyer, C.A. Mirkin, Wiley Publications, 2006.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

APPLICATIONS OF MICROPROCESSORS AND CONTROLLERS

(Open elective-II)

Course Objectives: The Student will

1. understand the control systems and types of control systems
2. understand the basic 16-bit microprocessor architecture and its functionalities and develop microprocessor basic programs for various applications.
3. develop the microcontroller based programs for various applications.
4. understand basic feature of 8051 controller.
5. understand the basics of PLC and SCADA and their functionalities.

Unit I: Introduction: Control Systems Components Role of control system in instrumentation, Open and close loop control system, types and Block diagram, Servomechanism and regulators with suitable examples, Basic control actions - On-off, Proportional, Derivative, Integral control, Proportional derivative (PD).

Proportional integral (PI), P Proportional integral and Derivative (PID) control, Basic control system components –AC/ DC Servo motor, AC/ DC Tacho generator, Stepper motor and Synchronous motor.

Unit II: Basics of Microprocessor

Introduction to microprocessor, Advantages and disadvantages of microprocessor control, Structure of microprocessor, Generalized architecture of microprocessor, Functions of each block, Functional block diagram of 8085 microprocessors with pin diagram, logical block diagram of 8085 Microprocessor-Registers.

ALU, memory organization, decoder, serial control section, interrupt section, timing and control section, Assembly language Programming of 8085, Addressing Modes, Instruction classification, Instruction formats, Basic Assembly Language programming (only simple arithmetic operations-addition, subtraction).

Unit III: Basics of Microcontroller 8051

Micro controllers and microprocessors, Pin diagram of 8051 microcontrollers, Internal RAM, ROM and Special function registers in 8051chip, I/O ports.

Counters and Timers, interfacing with external memory I/O ports, Counters and Timers, Interfacing with external memory.

Unit IV: Microprocessor and Microcontroller Applications

Different types of memories: ROM, RAM, PROM, EPROM, EEPROM, Schematic diagram of memory chips decoder, memory interfacing., Memory I/O data transfer scheme for 8255.

Interfacing of switches and LEDs, Simple application ns of microprocessor and Microcontroller for temperature control of furnace, Traffic light control and SCR firing angle control using microprocessor, Data acquisition system.

Unit V: Programmable Logic Controller and SCADA

PLC: CPU, I/O modules, bus system, power supplies and remote I/Os, counter, timer, Different PLC's available in market, Selection of a PLC, SCADA- Concept and Application.

TEXT BOOKS:

1. Control Systems Engineering, Nagarath I. J., Gopal M., New Age Publishers, New Delhi.
2. Microprocessor Architecture, Programming and Applications with 8085, Gaonkar, Ramesh S., Penram International Publishing (India) Pvt. Ltd.
3. The 8051 Microcontroller Architecture, Programming and Applications, Ayala, Kenneth J., Penram International Publishing (I) Pvt. Ltd.
4. Programmable Logic Controllers And Applications, Webb, John W Ronald Reis. A., Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Fundamentals of Microprocessors and Microcontrollers, Ram, B., Dhanpat Rai Publications, New Delhi.
2. Microprocessors and Interfacing Programming and Hardware, Hall, Douglass V., TMH publication, New Delhi.
3. The 8051 Microcontroller and Embedded Systems using Assembly and C, Ali, Muhamad Mazidi, Janice Mazidi Gillispie, Roli, PHI Learning, New Delhi.

Course Outcomes: The Student will be able to

1. design the different types of control systems and to full fill the desired specifications.
2. analyze 8085 microprocessors architectures and its functionalities and real time applications using programming languages like Assembly Language and MASM.
3. explain the basics of 8051 microcontroller's architecture and its functionalities.
4. design microcontroller based projects for real time applications.
5. analyze PLC and SCADA and their functionalities.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

FUNDAMENTALS OF HDL

(Open Elective-II)

Course Objectives: Students will

1. learn the fundamental of HDL language.
2. get the Knowledge about different levels of abstract.
3. construct Procedures, Tasks, and Functions using language.
4. write the programs in Mixed –Language Descriptions
5. define Synthesis and mapping of digital design

Unit I: Introduction: Why HDL?, A Brief History of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, simulation and synthesis, Brief comparison of VHDL and Verilog.
Data –Flow Descriptions: Highlights of Data-Flow Descriptions, Structure of Data-Flow Description, Data Type – Vectors.

Unit II: Behavioral Descriptions
Behavioral Description highlights, structure of HDL behavioral Description, The VHDL variable –Assignment Statement, sequential statements.
Structural Descriptions: Highlights of structural Description, Organization of the structural Descriptions, Binding, state Machines, Generate, Generic, and Parameter statements.

Unit III: Procedures, Tasks, and Functions
Highlights of Procedures, tasks, and Functions, Procedures and tasks, Functions. Advanced HDL Descriptions: File Processing, Examples of File Processing.
Mixed –Type Descriptions: Why Mixed-Type Description? VHDL User-Defined Types, VHDL Packages, Mixed-Type Description examples.

Unit IV: Mixed –Language Descriptions
Highlights of Mixed-Language Description, How to invoke One language from the Other.
Mixed-language Description Examples, Limitations of Mixed-Language Description.

Unit V: Synthesis Basics
Highlights of Synthesis, Synthesis information from Entity and Module.
Mapping Process and Always in the Hardware Domain.

TEXT BOOKS:
1. HDL Programming (VHDL and Verilog)- Nazeih M.Botros- John Weily India Pvt. Ltd. 2008.

REFERENCE BOOKS:
1. Fundamentals of HDL – Cyril P.R. Pearson/Sanguin 2010.
2. VHDL -Douglas perry-Tata McGraw-Hill.

3. A Verilog HDL Primer- J.Bhaskar – BS Publications.
4. Circuit Design with VHDL-Volnei A.Pedroni-PHI.

Course Outcomes: Students will be able to

1. understand the fundamental of HDL language.
2. analyze different levels of abstract.
3. create Procedures, Tasks, and Functions.
4. implement tasks in Mixed –Language Descriptions.
5. evaluate Synthesis and mapping of digital design.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

DATABASE MANAGEMENT SYSTEMS
(Open Elective-II)

Course Objectives:
The Student will:

1. Understanding of the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationship and develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the consequences of concurrent data access.

UNIT - I:

Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor

ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model

UNIT - II:

Introduction to the Relational Model

-Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra

-Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT - III:

Form of Basic SQL Query

-Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity‟s – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement

-Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT - IV:

Transaction Concept

-Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability– Implementation of Isolation – Testing for serializability- Lock – Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery and Atomicity

-Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT - V:

Data on External Storage

-File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Advanced Database Management System

Introduction to Distributed Database-Reference Architecture, fragmentation, Allocation, Joins

Text Books:

1. **Data Base Management Systems**, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. **Data base System Concepts**, Silberschatz, Korth, McGraw hill, V edition.

Reference Books:

1. **Data base Systems design,** Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. **Fundamentals of Database Systems,** Elmasri Navrate Pearson Education
3. **Introduction to Database Systems,** C.J.Date Pearson Education

Course Outcomes:

The student will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language sql.
5. Analyze functional dependencies for designing a robust database

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

CLOUD COMPUTING
(Open Elective-II)

Course Objectives:
Student will:

1. Learn about the cloud environment, services and hadoop
2. Classify cloud platforms and virtualization concepts
3. Identify cloud computing applications and enterprise cloud computing paradigms
4. Demonstrate cloud application development using python
5. Explain security concepts in the cloud

UNIT-I:

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

UNIT-II:

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization,

Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems

UNIT-III:

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT.

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV:

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python.

Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V:

Cloud management, Organizational Readiness and change management in the cloud age , Cloud Security, Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

TEXT BOOKS:

1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.

REFERENCE BOOKS:

1. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
2. Cloud computing: Dr Kumar Saurab Wiley India 2011.
3. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)

Course Outcomes:

Student will able to:

1. Understand about the cloud environment, services and hadoop
2. Differentiate cloud platforms and virtualization concepts
3. Describe cloud computing applications and enterprise cloud computing paradigms
4. Implement cloud application development using python
5. Apply security concepts in the cloud

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

E-WASTE MANAGEMENT

(OPEN ELECTIVE-II)

Course Objectives

At the end of the course , students will :

1. Know regarding E-Waste Management in India Global E-Waste Growth
2. Analyze the overview of WEEE.
3. Understanding scenarios for E-Waste management.
4. Visualize the basic concepts of E-Waste Regulation
5. Understand the basic concepts of Recycling technologies.

UNIT – I:

Introduction to e-Waste Management in India Global e-waste growth, Dark shadows of digitization on Indian horizon, e-waste generation, migration, Present practice and systems, disposal methods, Present processing practices, Initiatives to manage e-waste, Strengths and weaknesses of the current system.

UNIT – II:

WEEE (waste electrical and electronic equipment) - toxicity and healthHazardous substances in waste electrical and electronic equipment-toxicity and release, Occupational and environmental health perspectives of e-waste recycling.

UNIT – III:

Options and Scenarios for e-Waste Management Actions to be considered to achieve goals of e- waste management, Collection/ take back system, Closing the Plastic loop: Turning the supplychain into a supply cycle by mining plastics from end-of-life electronics and other durable
goods.

UNIT – IV:

E-waste regulation: E-waste legislation in the European Union and the Basel Convention. Regulating e-waste: a review of the international and national legal framework on e-waste Extended producer responsibility: a key tool for international rules and regulations on e-waste

UNIT – V:

Recycling technologies for e-waste Recycling of e-scrap in a global environment opportunities and challenges. Technologies for recovery of resources from e-waste. Reuse:A Bridge from Unsustainable e-waste to sustainable e-resources.

TEXT BOOKS:

1. Rakesh Johri, E-waste: Implications, regulations, and management inIndia and current global best practices.

2. Klaus Hieronymi, RamzyKahhat, Eric Williams, E-Waste Management: from Waste toResource

REFERENCE BOOKS:

1. Satish Sinha, PritiMahesh,Waste Electrical and Electronic Equipment The EU andIndia.
2. By Ronald E. Hester, Roy M. Harrison , Electronic WasteManagement.

Course Outcomes

At the end of the course , students will be able to:

1. Demonstrate knowledge of E-Waste management.
2. Implementing environmental health perspectives of E-Waste recycling.
3. Achieve goals of E-Waste management.
4. Develop the skills in E-Waste extended producer responsibility.
5. Describe the technologies for recovery of resources from E-Waste.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO WEB DESIGN

(OPEN ELECTIVE-II**)**

Course Objectives

At the end of the course , students will :

1. Know regarding internet related technologies.
2. Understanding of the current industry support for web technologies.
3. Explain the basic concepts of CSS.
4. Visualize the basic concepts of PHP.
5. Understanding PHP functions and Methods

UNIT-I

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Web Design Principles: Basic principles involved in developing a web site, Planning process , Five Golden rules of web designing, Designing navigation bar ,Page design, Home Page Layout, Design Concept.

UNIT-II

Introduction to HTML : What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, HTML Tables, HTML Forms.

Elements of HTML: Introduction to elements of HTML, Working with Text Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT-III

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet and types of CSS, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties).

CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Colors, Creating page Layout and Site Designs.

UNIT-IV

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops.

Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

UNIT-V

Introduction to Web Publishing or Hosting : Creating the Web Site, Saving the site, Working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

TEXT BOOK:

1. Dietel and Dietel : —Internet and World Wide Web - How to Program‖, 5th Edition, PHI/Pearson Education,2011
2. Web Technologies: HTML,CSS, XML,Php BlackBook.

REFERENCE BOOKS:

1. Chris Bates, —Web Programming, building internet applications‖, 2ndEdition, WILEY, Dreamtech,2008.
2. HTML 5 in simple steps Kogent Learning Solutions Inc, DreamtechPress
3. Beginning CSS: Cascading Style Sheets for Web Design Ian Pouncey, ichard York Wiley India.

Course Outcomes:

At the end of the course , students will be able to:

1. Develop the application of the HTML for documentstructure.
2. Develop the skills in analyzing the usable of awebsite.
3. Create dynamic webpage, usingPHP.
4. Using PHP to manipulateFiles.
5. Develop the concept of webpublishing

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	L	T-P-D	C
III Year - II Semester	3	0-0-0	3

INTRODUCTION TO EMBEDDED SYSTEMS

(OPEN ELECTIVE-II)

Course Objectives:
At the end of the course, students will learn:

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

UNIT–I:

Embedded Computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT–II:

The 8051 Architecture: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Basic Assembly Language Programming Concepts: The assembly language programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT–III:

Introduction to Real-Time Operating Systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Basic Design Using a Real-Time Operating System: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT–IV:

Embedded Software Development Tools: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

Debugging Techniques: Testing on host machine, using laboratory tools, an example system.

UNIT-V:

Introduction to advanced Architectures: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books:

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elseveir, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

References:

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

Course Outcomes:

At the end of the course, students will be able to:

1. Program an embedded system
2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.
3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.
4. Design embedded systems and real-time systems
5. Compare and contrast ARM, SHARC, internet enabled systems.

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

FUNDAMENTALS OF E-COMMERCE

(OPEN ELECTIVE-II)

Course Objectives:

At the end of the course, students will learn:

1. Identify the major categories and trends of e-commerce applications.
2. Identify the essential processes of an e-commerce system.
3. Identify several factors and web store requirements needed to succeed in e-commerce.
4. Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
5. Understand the main technologies behind e-commerce systems and how these technologies interact.

UNIT–I:

Introduction: Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT–II:

Consumer Oriented Applications: Mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT–III:

Electronic Data Interchange: EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT–IV:

Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books:

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce",Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course Outcomes:

At the end of the course, students will be able to:

1. Identify the business relationships between the organizations and their customers
2. Perform various transactions like payment, data transfer and etc.
3. Examine some typical distributed applications.
4. Detail some of the problems that are encountered when developing distributed applications.
5. Analyze the technologies that are used to support distributed applications.

Open Elective - III

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective-III)

Course Objectives: The Course objectives of this course are

1. To impart knowledge on Environmental management and environmental impact assessment.
2. To provide a basic understanding of the EIA process as it is used for research, planning, project or program evaluation, monitoring and regulatory enforcement.
3. To outline the impacts on soil, wetlands, flora, fauna, historical structures and the other socioeconomic environment.
4. To introduce students to the legal, economic, social, administrative and technical process preparing and evaluating environmental impact documents.
5. To assess the air and water quality parameters; predict the impacts and their mitigation measures.

UNIT - I:

Basics concepts of EIA: Initial environmental examination, elements of EIA, factors affecting EIA, impact evaluation and analysis, preparation of environmental base map, classification of environmental parameters.

EIA Methodologies: Introduction, Criteria for the selection of EIA methodology, EIA methods, Ad-hoc methods, matrix methods, network method, Environmental Media Quality Index Method (EMQI), Environmental media quality index method, overlay methods, cost/benefit analysis.

UNIT - II:

Impact of developmental activities and land use: Introduction and methodology for the assessment of soil and groundwater, delineation of study area, identification of of activities. Assessment of impact of developmental activities on vegetation and wildlife, environmental impact of deforestation- causes and effects of deforestation.

UNIT - III:

Procurement of relevant soil quality, impact prediction, assessment of impact significance, identification and incorporation of mitigation measures.

EIA of surface water, air and biological environment: Methodology for the assessment of impacts on surface water environment, air pollution sources, generalized approach for assessment of air pollution impact.

UNIT - IV:

Environmental audit and environmental legislation, objectives of environmental audit, types of environmental audit, audit protocel, stages of environmental audit onsite activities, evaluation of audit data and preparation of audit report, post audit activities.

UNIT - V:

Environmental protection Act, The water Act, The air Act (prevention and control of pollution Act), motor act, wild life act. Case studies of preparation of EIAs for various industries.

Text Books:

1. Environmental impact assessment methodologies, by Y.Anjaneyulu, B.S.Publication, Sultan bazaar Hyderabad.
2. Environmental impact assessment, by Alan Gilpin, Cambridge University Press

Reference Books:

1. Environmental pollution Control by Dr. H S Bhatia – Galgotia Publications Pvt Ltd, Delhi.
2. Environmental Impact Assessment and Management Publisher, Daya Author: B Hoisetti, A Kumar

Course Outcomes:

The Students will be able to

1. Explain different methodologies for environmental impact prediction and assessment.
2. Understand the elements of environmental impact assessments and processes by which they apply.
3. Carry out scoping and screening of developmental projects for environmental and social assessments.
4. Evaluate EIA reports.
5. Plan EIAs and environmental management plans

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

GREEN BUILDING TECHNOLOGY
(Open Elective-III)

COURSE OBJECTIVES: The objective of this course is to

1. Create awareness about the principles of green building technology and to have insight about the criteria for rating systems along with the established Indian codes and guidelines.
2. Establish a clear understanding of various renewable and non-renewable sources of energy along with their carbon foot prints and enumerates the process of performance testing including building modeling and energy analysis.
3. Discuss about the energy efficient green building materials and to have understanding on the cost-effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Give details on the principles of sustainable development in green building design.
5. Describe the best green building practices adopted along with cost/benefit and life-cycle analysis of green buildings.

UNIT-I

Concept of Green Buildings: Green building - Definition, Features, Necessity, Initiatives, Green buildings in India, Green building Assessment – Green Building Rating Systems (BREEAM, USGBC, LEED, IGBC, TERI-GRIHA, GREEN STAR), Criteria for rating, Energy efficient criteria, environmental benefits economic benefits, health and social benefits, Major energy efficiency areas for building, Contribution of buildings towards Global Warming. Life cycle cost of buildings, Codes and Certification Programs.

UNIT-II

Sources of Energy:

Renewable and Non-renewable sources of energy - Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources, potential of these sources, hazards, pollution with reference to Global scenario, demand and supply in India, Global efforts to reduce carbon emissions, Performance testing. Building modeling- Energy analysis, Metering, Monitoring.

Carbon emission: Forecasting, Control of carbon emission, Air quality and its monitoring carbon foot print, Environmental issues, Minimizing carbon emission, Energy retrofits and Green Remodels.

UNIT-III

Green Building Materials: Sustainable Materials, Depletion of natural resources for preparation of building materials, renewable and recyclable resources, energy efficient materials, Embodied Energy of Materials. Green cement, Biodegradable materials, Smart materials, Manufactured Materials, Volatile Organic Compounds (Voc's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials.

Green Building Planning and Specifications: Environment friendly and cost effective Building Technologies, Integrated Life cycle design of Materials and Structures, Green Strategies for Building Systems, Alternative Construction Methods, Energy Conservation Measures in Buildings, Waste and Water management and Recycling by Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar and Daylight, Plumbing and its Effect on Energy Consumption

UNIT-IV

Design of Green Buildings; Sustainable sites, Impact of construction on environment, Life cycle assessment, Principles of sustainable development in Building Design, Design on Bioclimatic and solar passive architecture, Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design, Advanced Green building technologies and innovations.

UNIT-V

Construction of Green Buildings: Energy efficient construction, Practices for thermal efficiency and natural lighting. Ecofriendly water proofing; Energy conservation building codes building rating, Maintenance of green buildings, Cost and Performance Comparisons and Benchmarking, Green Project Management Methods and Best Practices, Cost/benefit analysis of green buildings, Life-cycle analysis of green buildings, Case studies of rated buildings (new and existing)

TEXT BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPONPress
3. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Green Buildings (McGraw hill publication): by Gevorkian

REFERENCE BOOKS:

1. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
2. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider, W. W. Norton & Company Publisher.
3. Understanding Green Building Materials, Traci Rose Rider, W. W. Norton & Company Publisher.

List of free reference guides/resources available on the net:

1. IGBC reference guide
2. Free abridged versions of LEED reference guides
3. ECBC latest version
4. US GBC's Reference Material

COURSE OUTCOMES:

After completion of the course the student will be able to

1. Know the underlying principles, history, environmental and economic impacts of green building technology and to identify the criteria for rating systems along with the established Indian codes and guidelines.
2. Identify various Renewable and Non-renewable sources of energy along with their carbon foot prints and comprehend the techniques and benefits of building performance testing such as building modeling and energy analysis, monitoring and metering.
3. Recognize the energy efficient green building materials and explain the cost effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Identify and compare cost and performance of building materials with recycled components, non-petroleum-based materials, materials with low volatile organic compounds, materials with low embodied energy and salvaged materials and incorporate them into design.
5. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

Materials in Electrical Systems

(Open Elective - III)

UNIT - I:

Materials- Conductors-free electron theory and electron scattering Di electrics Polarization, solid, liquid and gas dielectrics Insulators-Classification, Application in electric devices.

UNIT - II:

Magnetic materials-classification based on orientation of magnetic dipoles, Optoelectronic materials, Semiconductors-simple and compound, Refractory Materials. Solders and contacts, Super conductivity and super conducting materials.

UNIT - III:

Components- Resistors and Capacitors. Display units:-LED, LCD and Monitors. Effect of environment on components.

UNIT - IV:

Processes- Basic processes used in the manufacture of integrated circuits such as Epitaxy, masking, photolithography, diffusion, oxidation, Etching, metallization, Scribing, wire bonding and Encapsulation. Induction and Dielectric heating. Electron beam welding and cutting.

UNIT - V:

Cables- Calculations of capacity of cables, charging current, stress, grading, heating of cables, Construction and characteristics of HV & EHV cable

Text Books:

1. S.O. Kasap, Principles of Electrical Engineering Materials," MGH.
2. Mahajan, Principles of growth and processing of semiconductors," MGH.

References Books:

1. Dhir, Electronic components and Materials Principles manufacturing and Maintenance," TMH.
2. Allison, „Electronic Engineering Materials and Devices," TMH.
3. Ruska N Scot, Microelectronic processing – an introduction to the manufacture of integrated circuits," MGH.
4. Decker, Electrical Engineering Materials," PHI.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

Field Theory and Circuits
(Open Elective - III)

UNIT - I: Field Theory:
Review of Vector Analysis- Coordinate Systems, Vectors, gradient, divergence, curl, Laplacian, divergence theorem, Stoke‟s theorem.

UNIT - II:
Electric and Magnetic fields- Electric fields due to distributed charges configurations line(s) of charges, uniform plane surface and spherical volume charge distributions; behavior of conductors and dielectrics in electrostatic fields, boundary conditions, applications of ampere‟s law and Biot- Savart‟s law; capacitance and inductance calculations for simple configurations; time varying fields – displacement current, Maxwell‟s equations; Laplace‟s and Poisson‟s equations.

UNIT - III: Circuit Theory:
Classification of circuits, sources and signals, standard signals, source transformations. Network topology, graph matrices, formulation and solution of circuit equations based on graph theory using different analysis techniques- circuit, cut set and mixed. Concept of duality.

UNIT - IV:
Network theorems and their applications-Superposition, reciprocity, Thevenin, Norton, Maximum power transfer, Millman, Substitution, Compensation and Tellegan‟s theorem. Analysis of circuits subject to periodic and non-periodic excitations using Fourier series and Laplace transforms.

UNIT - V:
Concept of free and forced response of circuits. Time constants and Transient response under d.c. and a. c. excitation. Analysis of magnetically coupled circuits. Analysis of circuits with dependent sources.

Text Books:

1. N.N. Rao, „Basic Electromagnetic with applications‟, PHI
2. Desoer & Kuh, — Basic Circuit theory‖, McGraw Hill.

References Books:

1. E.C. Jordan and K.G. Balmain, „Electromagnetic waves and radiating systems‟, PHI
2. D.J. Griffith, „Introduction to Electrodynamics‟, PHI .
3. Guru & Hiziroglu, „ Electromagnetic field theory fundamentals‟, Vikas Publishing House
4. Van Valkenberg , —Network Analysis‖, PHI.
5. Valkenberg & Kinariwala , —Linear Circuits‖, PHI.
6. Trick , —Introduction to circuit Analysis‖, Wiley.
7. Roy Choudhary , —Networks & systems‖, Wiley.

J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY

UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year -II Semester	**3**	**0-0-0**	**3**

RELIABILITY ENGINEERING

(OPEN ELECTIVE-III)

Course Objectives:

The student will

1 Know the micro systems and its manufacturing techniques.

2 Understand the working of micro sensors and actuators.

3 Design Microsystems

Course Outcomes:

The student will be able to

1 Overview of micro systems and explain the micro manufacturing techniques.

2 Discuss the principles and types of micro sensors and actuators.

3 Understand the fundamentals of micro fluidics and design Microsystems.

UNIT - I

Basics concepts of reliability: Introduction, Reliability and quality, Failures and failure modes, Causes of failures and reliability, Maintainability and availability, History of reliability, reliability literature.

Reliability mathematics: Introduction, Random experiment , Probability , Random variables, Distribution functions, Discrete distribution ,Continuous distribution, Numerical characteristics of random variables , Laplace transform.

UNIT- II

Component reliability and hazard models: Introduction, Component reliability from test data, Mean time to failure, Time – dependent hazard models, Stress- Dependent hazard models, Derivation of reliability function using Markov, Treatment of field data.

System reliability models: Introduction - Systems with component within series - Systems with parallel components - k-out – of- m systems - Non series parallel systems - Systems with - mixed – mode failures - Fault- tree technique

UNIT- III

Maintainability and availability concepts: Introduction - Maintainability function - Availability function - Frequency of failures - Two-unit parallel systems with repair - k-out- of-m systems - Preventive maintenance.

Reliability improvement: Introduction - Improvement components - Redundancy - Element redundancy - Unit redundancy - Stand by redundancy - Optimization - Reliability – cost trade – off.

UNIT- IV

Economics of reliability engineering: Economic issues - Manufacture's cost - Customer's cost - Reliability achievement cost - models - Reliability utility cost models - Depreciation cost models - Availability – cost – model of parallel systems

UNIT- V

Reliability management: Reliability programming - Management policies and decision - Reliability management by objectives - Reliability group - Reliability data: Acquisition and analysis - Managing people for reliability.

TEXT BOOKS;

1. Reliability Engineering: Balaguruswamy, Tata McGrawHill
2. Reliability Engineering: L.B.Srinath, East West Publications.

REFERENCE BOOKS:

1. Reliability Engineering: Patrick DTO, Wiley Conor-India
2. Reliability Engineering and life testing, Naikan-PHI Publications.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

SPECIAL MANUFACTURING PROCESS
(OPEN ELECTIVE-III)

Course Objectives:
The Student will :

1. To expose the students to a variety of manufacturing processes including their typical use and capabilities.
2. To teach the important effects that manufacturing processes may have on the material properties of the processed part with a focus on the most common processes.
3. To teach the thermal and mechanical aspects, such as force, stress, strain, and temperature, of the most common processes.
4. To provide a technical understanding of common processes to aid in appropriate process selection for the material and required tolerances
5. To provide a technical understanding of common processes to aid in appropriate material selection for a predetermined process

UNIT I: Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns – Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands. Methods of Melting – Crucible melting and cupola operation – Defects in castings; Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design. Solidification of casting – Solidification of pure metal – Nucleation and grain growth, casting design considerations.

UNIT II: Welding: Classification – Types of welds and welded joints; Gas welding – Types, oxy-fuel gas cutting – standard time and cost calculations. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

UNIT III: Inert Gas Welding _ TIG Welding, MIG welding, Friction welding, induction welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT IV: Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth. Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT V: Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion – Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

TEXT BOOKS :

1. Manufacturing Technology / P.N. Rao Vol.1 & 2 / Mc Graw Hill
2. Manufacturing Engineering & Technology / Serope Kalpakjian / Steven R. Schmid /Pearson

REFERENCES:

1. Metal Casting / T.V Ramana Rao / New Age
2. Production Technology / G. Thirupathi Reddy / Scitech

Course outcomes:

The student will be able to:

1. Understand the idea for selecting materials for patterns. Types and allowances of patterns used in casting and analyze the components of moulds.
2. Design core, core print and gating system in metal casting processes
3. Understand arc, gas, solid state and resistance welding processes.
4. Develop process-maps for metal forming processes using plasticity principles.
5. Identify the effect of process variables to manufacture defect free products

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

PRINCIPLES OF COMPUTER COMMUNICATION AND NETWORKS

(Open Elective-III)

Course Objectives:

1. To understand the Analog and Digital Communication concepts.
2. To understand the concept of computer communication.
3. To learn about the networking concept, layered protocols.
4. To understand various communications concepts.
5. To get the knowledge of various networking equipments.

UNIT-I

Analog and Digital Communication Concepts: Representing data as analog signals, representing data as digital signals, data rate and bandwidth reduction, Digital Carrier Systems.

UNIT II

Overview of Computer Communications and Networking: Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, The Telephone System and Data Communications.

UNIT III

Essential Terms and Concepts: Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications, Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

UNIT IV

Physical and data link layer Concepts: The Physical and Electrical Characteristics of wire, Copper media, fiber optic media, wireless Communications. Introduction to data link Layer, the logical link control and medium access control sub-layers.

UNIT V

Network Hardware Components: Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, switches Vs Routers.

TEXT BOOKS:

1. Computer Communications and Networking Technologies, Michel A. Gallo and William H. Hancock, Thomson Brooks / Cole.
2. Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition MC GRAW HILL EDUCATION, 2006.

REFERENCE BOOKS:

1. Principles of Computer Networks and Communications, M. Barry Dumas, Morris Schwartz, Pearson.
2. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

Course Outcomes: The student will be able to

1. explain the networking of computers and data transmission between computers.
2. exposure about the various communication concepts.
3. get awareness about the structure and equipment of computer network structures.
4. illustrate the Physical and data link layer concepts.
5. get knowledge about network hardware components.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

SPEECH PROCESSING
(Open Elective-III)

Course Objectives:

1. To introduce speech production and related parameters of speech.
2. To show the computation and use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.
3. To understand different speech modeling procedures such as Markov and their implementation issues.
4. To understand the basic concepts of speech recognition.
5. To gain knowledge on speech synthesis.

UNIT- I :BASIC CONCEPTS:
Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

UNIT- II: SPEECH ANALYSIS:
Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

UNIT- III: SPEECH MODELING:
Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, and Implementation issues. Speech Recognition: Large Vocabulary Continuous.

UNIT- IV: SPEECH RECOGNITION:
Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – ngrams, context dependent sub-word units; Applications and present status.

UNIT –V: SPEECH SYNTHESIS:
Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

Text Books:

1. Lawrence Rabiner and Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson education, 2003.
2. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.

References:

1. Steven W. Smith, “The Scientist and Engineer‟s Guide to Digital Signal Processing”, California Technical Publishing, 1997.
2. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education, 2004.

Course Outcomes:

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

1. model speech production system and describe the fundamentals of speech.
2. extract and compare different speech parameters.
3. choose an appropriate statistical speech model for a given application.
4. design a speech recognition system.
5. use different speech synthesis techniques.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year – II Semester	**3**	**0-0-0**	**3**

SOFT COMPUTING
(Open Elective-III)

Course Objectives:
Student will:

1. Classify the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications
2. Develop the understanding concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
3. To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering.
4. Decribe fuzzy systems with membership functions
5. Determine the genetic algorithms, its applications and advances.

UNIT-I:
Introduction: Neural Networks, Fuzzy Logic, Genetic Algorithms, Hybrid Systems, Soft Computing, Soft Computing Constituents, Soft Computing Characteristics. Artificial Neural Networks: Introduction, Fundamental Concept, Evolution of Neural Networks, Basic models of ANN, Important Terminologies.

UNIT-II:
Supervised Learning Networks : Introduction, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks : Introduction, Training Algorithms for pattern association and Hopfield Networks.

UNIT-III:
Unsupervised Learning Network : Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Counter Propagation Networks.
Fuzzy Sets : Introduction, Classical Sets, Fuzzy Sets, Classical Relations, Fuzzy Relations

UNIT-IV:
Membership functions- Features, Fuzzification, Membership value assignments, Defuzzification Methods, Fuzzy Arithmetic, Fuzzy Measures, Fuzzy Inference Systems, Fuzzy Logic Control Systems

UNIT-V:
Genetic Algorithms- Introduction, Basic operators and terminology, Traditional Algorithm vs Genetic Algorithm, Simple GA, General GA, Classification of GA, Genetic Programming, Applications of GA.
Applications of Soft Computing : Internet Search Technique, Hybrid Fuzzy Controllers.

TEXT BOOKS:

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007
2. Neuro-Fuzzy and Soft Computing A Computational Approach to Learning and Machine Intelligence – J.S.R.Jang, C.T.Sun, E.Mizutani, PHI 177

REFERENCE BOOKS:

1. Artificial Intelligence and Soft Computing- Behavioral and Cognitive Modeling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva,. Pearson Edition, 2004.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.

Course Outcomes:

Student will able to:

1. Learn about soft computing techniques and their applications
2. Analyze various neural network architectures
3. Apply perceptrons and counter propagation networks.
4. Define the fuzzy systems
5. Analyze the genetic algorithms and their applications

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year – II Semester	**3**	**0-0-0**	**3**

E-COMMERCE
(Open Elective-III)

Course objectives:

1. Gain knowledge about the main objective and at the same time need is transaction on your web store. Of, course if you are selling products online what you require are customers. If you are getting good reach ability then your business will definitely grow. Therefore one of the objectives is high reachability.
2. Solve conversions i.e., if people are coming on your web store and purchasing something then it will calculate as conversions and from the number of people who are buying stuff from your web store we can calculate the conversion rate.
3. Provide customer satisfaction i.e., customer is the main part of any e-commerce business so it's very important to make your customer happy and satisfied by providing quality and desirable products, on time delivery, 24*7 customer support, and timely sale & best deal offers you can make your customer happy. It is one of the main objectives of e-commerce.
4. Receive social popularity i.e., unless and until you are not famous and popular among people you cannot establish your brand. Social presence with omni channel and digital marketing is essential for any e-commerce business.
5. Know about Consumer Search and Resource Discovery.

UNIT-I:
Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT-II:
Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.
Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT-III:
Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.
Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT-IV:
Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course outcomes:

1. Demonstrate an understanding of the foundations and importance of e-commerce.
2. Demonstrate an understanding of retailing in e-commerce by:
    a. Analyzing branding and pricing strategies,
    b. Using and determining the effectiveness of market research.
    c. Assessing the effects of disintermediation.
3. Analyze the impact of e-commerce on business models and strategy.
4. Describe internet trading relationships including business-to-business, intraorganizational.
5. Describe the infrastructure for E-Commerce.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year – II Semester	**3**	**0-0-0**	**3**

INTERNET OF THINGS
(Open Elective-III)

Course Objectives

1. Understand the current vision of the Internet of Things and its impact on the world
2. Classify basic concepts of IoT and M2M &IoT system management
3. Describe concepts of python language and different python packages.
4. Explain how to design IoT Physical devices with built-ins of python Programs
5. Identify the advanced concepts of IoT physical servers, cloud offerings.

UNIT-I:

Introduction to Internet of Things –Introduction, Definition and Characteristics of IoT,
Physical Design of IoT – Things inIoT, IoT Protocols, Logical Design of IOT- IoT Functional Blocks,IoTCommunication Models, IoT Communication APIs
IoT Enabling Technologies – Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems
Domain Specific IoTs – Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

UNIT-II:

IoT and M2M – Introduction,M2M,Difference between IOT and M2M,**SDN and NFV for IoT**-Software Defined Networking, Network Function Virtualization,
IoT System Management with NETCONF-YANG- Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements,NETCONF, YANG, NETOPEER.

UNIT-III:

IoT Systems-Logical Design Using Python-Introduction, Installing Python, Data types and Data Structures, Control Flow, Functions, Modules, Packages, File handling, Date/Time Operations, Classes.
Python Packages of Interest for IoT- JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT-IV:

IoT Physical Devices and Endpoints – What is an IoTDevice,Exemplary Device: Raspberry Pi,About the Board,Linux on Raspberry Pi, Raspberry PI-Interfaces (Serial, SPI, I2C),Programming
Raspberry Pi with Python-Controlling LED, interfacing an LED and Switch and interfacing a light sensor with Raspberry Pi,

UNIT-V:

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage Models and communication APIs.
WAMP-AutoBahn for IoT,Xively Cloud for IoT, Python web application framework
Designing a RESTful web API,

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Course Outcomes

1. Analyze current vision of the Internet of Things and its impact on the world.
2. Demonstrate basic concepts of IoT and M2M &IoT system management
3. Practice the concepts of python language using different python packages
4. Design IoT Physical devices using python Programming.
5. Categorize advanced concepts of IoT physical servers, cloud offerings.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year II- Semester	**3**	**0-0-0**	**3**

SEMANTIC WEB AND SOCIAL NETWORKS

(Open Elective-III)

Course Objectives

1. Explain the fundamentals of Semantic Web technologies.
2. Explain the Implementation of semantic web applications and the architectures of social networking
3. Discuss which brings together forward looking research and technology that will shape our world more intimately than ever before as computing becomes an extension of human experience;
4. Discuss that covers all aspects of computing that is very closely tied to human perception, understanding and experience;
5. Discuss which brings together computing that deal with semantics, perception and experience and serves as the Plat form for exchange of both practical technologies and far reaching research.

UNIT I

Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web

Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee, www, Semantic Web Road Map, Logic on the semantic Web.

UNIT II

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web - Resource Description Framework (RDF) / RDF Schema. Ontology Web Language (OWL), UML, XML and XML Schema.

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping,

UNIT III

Logic, Rule and Inference Engines. Semantic Web applications and services. Semantic Search,e-learning, Semantic Bioinformatics, Knowledge Base

UNIT IV

XML Based Web Services, Creating an OWL-S Ontology for Web Services. Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT V

What is social Networks analysis, development of the social networks analysis.Electronic Sources for Network Analysis - Electronic Discussion networks.

Blogs and Online Communities. Web Based Networks. Building Semantic Web Applications with social network features.

TEXTBOOKS:

1. Thinking on the Web - Berners Lee.Godel and Turing,Wiley interscience,20()8.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCE BOOKS:

1. Semantic Web Technologies,Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer. Paul \Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

Course Outcomes

1. Demonstrate knowledge and be able to explain the three different “named” generations of the web
2. Demonstrate the ability to participate materially in projects that develop Programmes relating to **Web** applications and the analysis of Web data.
3. Analyze key Web applications including search engines and social networking sites.
4. Illustrate the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
5. Analyze and explain how technical changes affect the social aspects of Web-based computing.

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

FUNDAMENTALS OF INTELLIGENCE SYSTEMS

(OPENELECTIVE-III)

Course Objectives:

1. Understand In-depth of specialist bodies of knowledge within the engineering discipline.
2. Establish engineering methods to complex engineering problem solving.
3. Be Fluent application of engineering techniques, tools and resources .
4. Learn the difference between optimal reasoning vs human like reasoning.
5. Understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities

UNIT–I:

Introduction to Artificial Intelligence: Introduction to AI-Problem formulation, Problem Definition -Production systems

Control strategies, Search strategies. Problem, characteristics, Production system characteristics -Specialized production system

UNIT–II:

Representation of Knowledge: Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution

Use of predicate calculus, Knowledge representation using other logic Structured representation of knowledge.

UNIT–III:

Knowledge Inference: Knowledge representation Production based system, Frame based system

UNIT–IV:

Inference - Backward chaining, forward chaining, Rule value approach Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT-V:

Expert Systems: Expert systems - Architecture of expert systems

Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics.

Text Books:

1. Kevin Night, Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Tata McGraw-Hill Education Private Limited, 3rd edition, 2009, ISBN: 978-0070678163.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2nd edition, 2007.ISBN, 0132097680.

Course Outcomes:

1. Gain basic understanding of the underlying principles and philosophy of computational intelligence systems Technologies.
2. Be capable of constructing intelligent systems (in software) that perform useful engineering tasks.
3. Possess the ability to formulate an efficient problem space for a problem expressed in English.
4. Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
5. Possess the skill for representing knowledge using the appropriate technique.

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO NEURAL NETWORKS

(OPEN ELECTIVE-III)

Course Objectives:

1. Understand the differences and similarities neural network, human brain and feedback systems
2. Learn the different learning techniques
3. Familiar with the concept of single layer perceptron and its algorithms.
4. Familiar with the concept of multilayer perceptron and its algorithms
5. Know the self-organisation mapping techniques.

UNIT–I:

Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs

Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

UNIT–II:

Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning

Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT–III:

Single layer perceptrons: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves

Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier foe a Gaussian Environment.

UNIT–IV:

Multilayer Perceptrons: Back propagation algorithm XOR problem

Heuristics, Output representation and decision rule, computer experiment, feature detection.

UNIT-V:

Self –Organization Maps: Two basic feature mapping models, Self-Organization maps, SOM algorithm.

Hopfield models: Hopfield models, computer experiment.

Text Books:

1. Neural networks A comprehensive foundation, Simon Haykin, PHI edition.
2. Artificial neural networks- B. Vegnanarayana Prentice Halll of India P Ltd 2005.

Reference Books:

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapura. Pearson education 2004.

Course Outcomes:

1. Know differences and similarities between neural network, human brain and feedback systems
2. Get the knowledge of different learning techniques
3. Describe the concept of single layer perceptron and its algorithms.
4. Describe the concept of multilayer perceptron and its algorithms.
5. Analyse the self-organisation mapping techniques.