ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

COLLEGE CODE : C4

MECHANICAL ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2018-2019)

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS)

Narsampet, Warangal (Rural) – 506 332
Telangana State, India

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)
NARSAMPET, WARANGAL(Rural) – 506 332. T.S.

Academic Regulation-2018 of B.Tech (Regular) Programme under Choice Based Credit System (CBCS)

(Effective for the students admitted into I-Year from the Academic year 2018-2019)

1. Award of B.Tech. Degree

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

i) Pursued a course of study for not less than four academic years and not more than eight academic years.

ii) Register for 160 credits and should secure 160 credits. A student will be eligible to get B.Tech. Degree with Honors, if he/she completes an additional 20 credits through **Massive Online Open Courses (MOOCs).** Each subject offered by UGC/AICTE/NPTEL/NEC or equivalent carries 2 credits.

iii) A Student can earn 2 credits by active participation in NSS. As no grade is defined for these 2 credits they are not included in CGPA Calculations. Based on their participation in NSS activities, the student can earn maximum of 100 activity points as specified in the **Annexure.**

Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech course unless extension is granted by College Academic Council (CAC) to complete the course for a further period.

2. Courses of Study

The following courses of study are offered at B.Tech level :

Branch Code	Branch
01	Civil Engineering
02	Electrical & Electronics Engineering
03	Mechanical Engineering
04	Electronics & Communication Engineering
05	Computer Science &Engineering

3. Credits :

All subjects/ courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each subject/course in a L:T:P:C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) structure, based on the following table.

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hr. Practical (Lab) per week	1 credit

4. Subject / Course Classification :

S.No.		Credits
1	Humanities and Social Sciences including Management courses	12*
2	Basic Science courses	25*
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	24*
4	Professional core courses	48*
5	Professional Elective courses relevant to chosen specialization / branch	18*
6	Open subjects-Electives from other technical and / or emerging subjects	15*
7	Project work, seminar and internship in industry or elsewhere	15*
8	Mandatory courses [Environmental Sciences, Induction Program, Indian Constitutional, Essence of Indian Traditional Knowledge]	Non-Credit
	Total (%)	**160 (100%)**

**Minor variation is allowed as per need of the respectivedisciplines*

5. **Course Registration:**

5.1 Each student, on admission shall be assigned to a Faculty Advisor/ Counselor who shall advise her/him about the academic programmes and counsel on the choice of courses in consideration with the academic background and student's career objectives.

5.2 Faculty advisor shall be only from the engineering departments. With the advice and consent of the Faculty Advisor the student shall register for a set of courses he/she plans to take up for each Semester.

5.3 The student should meet the criteria for prerequisites to become eligible to register for that course.

5.4 A student is allowed to register for more than 160 credits in completion of B.Tech. programme. However, additionalcredits scored shall not be considered for award of division and also not considered for calculation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA). For such extra subject(s) registered a letter grade alone will be indicated in te Grade card as a performance measure.

6. Subjects / Courses to be offered:

6.1 Students shall have to register for the courses during the preparation and practical examinations of the previous semester. However for the first year, the students have to register for courses within a week from the commencement of class work.

6.2 The maximum number of students to be registered in each course shall depend upon the physical facilities available.

6.3 The information on list of all the elective courses offered in every department specifying the credits, the prerequisites, a brief description of syllabus or list of topics and the time slot shall be made available to the student in time.

6.4 In any department, preference for registration shall be given to those students of that department for whom the course is a core course.

6.5 The registration for the inter departmental and/or open elective courses shall be on first come first served basis, provided the student fulfills prerequisites for that course, if any. The number of students to be registered shall be based on the class room and laboratory capacity. Every effort shall be made by the Department/Centre to accommodate as many students as possible.

6.6 No course shall be offered unless there is a minimum of 20 students or one half of the class strength specified.

7. Programme Pattern:

i. The entire course of study is of four academic years. All years shall be on semester pattern i.e two semesters per year. For each semester there shall be a minimum of 90 instruction days.

ii. A student is eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.

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

8. Distribution and Weightage of Marks:

8.1 The Performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory and 100 marks for practical subjects. In addition, Industry oriented mini-project, Seminar, Comprehensive Viva-Voce and Major Project Work shall be evaluated for 100 marks.

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

8.3 For theory subjects, during the semester there shall be 2 mid-term examinations (internal exams) and two assignments carrying 5 marks each.

8.4 Each mid-term examination of 90 minutes consists of Part-A (objective type) for 10 marks and Part-B (subjective paper) for 15 marks. Mid-term examination paper shall contain 5 questions out of which the student has to answer 3 questions of each 5 marks. First mid-term examination shall be conducted for first 2.5 units (50%) of syllabus and second mid-term examination shall be conducted for remaining 2.5 units (50%) of syllabus. Objective type may be with multiple choice questions, true/false, match type questions, fill in the blanks etc.

For the subject Gender Sensitization 30 marks are allotted for assignments and 70 marks are allotted for mid examination. Mid examination consists of questions and student has to answer 5 questions of 14 marks of each.

8.5 First set of Assignment should be submitted before the conduct of the first mid-term examination and the second set of Assignment should be submitted before the conduct of the second mid-term examination. The assignments shall be as specified by the concerned subject teacher.

8.6 The first mid-term examination marks and first assignment marks make first set of internal evaluation and second mid-term examination marks and second assignment marks make second set of internal evaluation marks. After adding 70% of the marks obtained in the first or second set whichever is higher and 30% of marks obtained in the first or second set whichever is lower are to be considered for awarding internal marks.

8.7 The details of the Question Paper pattern for theory examination is as follows:

(i) The end semesters exam will be conducted for 70 Marks which consist of two parts viz. Part-A for 20 Marks and Part-B for 50 Marks.

(ii) Part-A is compulsory question which consist of 5 Sub-questions, one from each unit, carrying 4 Marks each.

(iii) Part-B consist of 5 questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions, there will be an either or choice(i.e There will be two questions from each unit and student will answer any one question).

8.8 For practical subjects there shall be a continuous internal evaluation during the semester for 30 sessional marks and 70 end examination marks. Out of the 30 sessional marks, day-to-day work in the laboratory shall be evaluated for 20 marks and internal examination for practical shall be evaluated for 10 marks conducted by the concerned laboratory teacher. The end examination shall be conducted with one external examiner and one internal examiner. The external examiner shall be appointed from the panel of examiners as recommended by the Board of Studies in respective Branches.

8.9 For the subject having design and/or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for day-to-day work and 10 marks for internal test) and 70 marks for end examination.

8.10 There shall be a mini project preferably suggested by the industry of their specialization. The mini project shall be submitted in a report form and should be presented before the committee, which shall be evaluated for 100 marks. The committee consists of Head of the Department, Supervisor of mini project and a senior faculty member of the department.

8.11 There shall be a seminar presentation by the student. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report and presentation shall be evaluated for 100 marks.

8.12 There shall be an internship suggested by the industry of their specializatiion. After completing their internship stdentshould submit a report in the department, which shall be evaluated by the department for 100 marks.

8.13 The Comprehensive Viva-Voce and Evaluation : The Comprehensive Viva-Vocewill be conducted by a Committeecosisting of (i) Head of the Department. (ii) Two Senior Faculty Members of the Department. The Comprehensive Viva-Voce is imed to assess the student's understanding in various subjects he/she studied during the B.Tech. Programme. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee.

8.14 Out of a total of 100 marks for the major project work, 30 marks shall be for internal evaluation and 70 marks for the end semester examination. The end semester examination (Viva-Voce) shall be conducted by a committee. The committee consists of an External Examiner, Head of the

Department and the Project Supervisor. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his major project.

8.15 There shall be an optional third midterm examination and intereste students can register for third mid examination by paying prescribed registration fee, which covers entire semester syllabus carrying 25 marks and assignment 5 marks.

For evaluation of internal marks the marks obtained in best two midterm examinations will be considered.

9. Attendance Requirements:

9.1 A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of aggregate attendance in all the subjects.

9.2 Condonation of shortage of attendance in each subject up to 10% on genuine grounds in each semester may be granted by the College Academic Council on recommendation by the Principal.

9.3. Shortage of attendance below 65% shall in no case be condoned.

9.4. Student falling short of attendance as specified above will be detained.

9.5. A student will not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester. They may seek-re-admission for that semester when offered next. They may seek re-registration for all those subjects registered in that semester, in which he got detained, by seeking re-admission for that semester as and when offered; in case 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. A stipulated fee decided by the College Academic Council shall be payable towards condonation of shortage of attendance.

10. Minimum Academic Requirements:

The following academic requirements have to be fulfilled in addition to the attendance requirements mentioned in item No. 09.

10.1 A student shall be deemed to have fulfilled the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.

10.2 Promotion Rules :

S.No.	Promotions	Conditions to be fulfilled
1.	First Year first semetser to first year second semester	Regular Course of study of first year first semetster
	First year second semeter to second year first semester	(i) Regular course of Study of first year semester (ii) Must have secured atleast 20 credits out of 40 credits i.e. 50% credits upto first year second semester from all relevant regular and supplementary examinations, whichever the student takes those examinations or not
2. `	Second year first semester to second year second semester	Regular course of study of second year first semester
	Second year second semester to third year first semester	(i) Regular course of study of second year second semester (ii) Must have secured atleast 48 credits out of 80 credits i.e. 60% credits upto second year second semester from all relevant regular and supplemenatary examinations, whether the student takes those examina tions or not
3.	Third year first semester to third year second semester	Regular course of study of third year first semester.
	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester (ii) Must have secured atleast 72 credits out of 120 credits i.e. 60% credits upto third year sec--ond semester from all relevant regular and supplemenatary examinations, whether the stu dent takes those examinations or not
	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

10.5 A student shall register for all subjects covering 160 credits as specified and listed (with the relevant course/subjects classifications as mentioned) in the course structure, put up all the attendance and academic requirements and securing a minimum of C Grade (Pass Grade) or above in each subject, and earn 160 credits securing Semester Grade Point Average (SGPA) $\geq$ 5 in each semester, and Cumulative Grade Point

Average (CGPA) > 5 at the end of each successive semester to successfully complete the B.Tech Programme.

10.6 When a student is detained due to shortage of attendance in any semester, he/she may be re-admitted into that semester, as and when offered, with the Academic Regulations of the batch into which he gets readmitted. However, no grade allotments of SGPA/CGPA calculations will be done for that entire semester in which he got detained.

10.7 When a student is detained due to lack of credits in any year, he/she may be readmitted in the next year, after fulfillment of the academic requirements, with the academic regulations of the batch into which he gets readmitted.

10.8 A student is eligible to appear in the end semester examination in any subject/course, but absent at it or failed (thereby failing to secure C Grade or above), may reappear for that subject/course at the supplementary examinations as and when conducted. In such cases, his/her internal marks assessed earlier for that subject/course will be carried over, and added to the marks to be obtained in the supplementary examination, for evaluating his performance in that subject.

11. Grading Procedure

11.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals or Seminar or Project or Mini-Project, Internship based on the % of marks obtained in End examination, both taken together as specified in item No. 07 above and a corresponding Letter Grade shall be given.

11.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed.

Grades and Grade Points

% 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

11.3 A student obtaining 'F' Grade in any subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the End Semester Examination, as and when offered. In such cases, his Internal Marks in those Subject(s) will remain same as those he obtained earlier.

11.4 A Letter Grade does not imply any specific % of Marks.

11.5 In general, a student shall not be permitted to repeat any Subject/ Course(s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he/she has to repeat all the Subjects/Courses pertaining to the Semester, when he/she is detained (as listed in Item No. 10.7 - 10.8).

11.6 A student earns Grade Point (G.P.) in each Subject/Course, on the basis of the Letter Grade obtained by him in that Subject/Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points'(C.P.) are computed by multiplying the Grade Point with Credit Points (C.P.) for that particular Subject/Course.

Credit points (C.P.) = Grade Points (G.P.) X Credits …….. For a Course

11.7 The student passes the Subject / Course only when he gets G.P. $\geq$ (C Grade above).

11.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (C.P.) Secured from All Subjects/Courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to Two Decimal Places. SGPA is thus computed as

$\left\{\sum_{i=1}^{N} C_i G_i\right\} / \left\{\sum_{i=1}^{N} C_i\right\}$ … For each semester

Where "*i*" is the subject indicator index (taken into account all subjects in a semester), ' N ' is the number of subjects 'REGISTERED' for the Semester (as specifically required and listed under the course Structure of the parent Department), and C_i is the number of Credits allotted to the i^{th} subject and G_i is represents the Grade Points (G.P.) corresponding to the Letter Grade awarded for that i^{th} Subject.

11.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in all registered Courses (with an exemption of 6 credits in electives subjects) in all semesters. CGPA is rounded off to two decimal places. CGPA, is thus computed from the I year, Second-Semester onwards, at the end of each semester, as per the formula.

$\left\{\sum_{j=1}^{M} C_j G_j\right\} / \left\{\sum_{j=1}^{M} C_j\right\}$ …for all 'S' semesters registered (i.e., upto 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' from the 1st Semester onwards upto and inclusive of the semester S (obviously M > N), '*j*' is the subject indicator index takes into account all subjects from 1 Subject and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that j^{th} subject. After registration and completion of I year I semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

11.10 For Merit Ranking or Comparison purpose or any other listing only the rounded off values CGPAs will be used.

11.11 For calculation listed in item No.11.6 - 11.10**,** 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.

12. Passing Standards :

12.1 A student shall be declared successful or 'passed' in a Semester only when he gets a SGPA > 5 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the B.Tech. Programme, only when he gets a CGPA > 5;subject to the condition that he secures a GP > 5 (C Grade or above) in every registered Subject/ Course in each Semester (during the B.Tech Programme) for the Degree Award as required.

12.2. In spite of securing C Grade or above in some (or all) Subjects/Courses in any Semester, if a Student receives a SGPA < 5 and /or CGPA < 5 at the end of such a Semester, then he may be allowed on the following specific recommendations of the Head of the Department and subsequent approval from the Principal.

i.) To go into the next subsequent Semester (Subject to fulfilling all other attendance and academic requirements as listed under items No.9- 10).

ii.) To 'improve his SGPA of such a Semester (and hence CGPA to 5 or above', by reappearing for one or more as per student's choice or the same subject (s)/courses(s) in which he has secured C Grade (s) in that semester,at the supplementary examinations to be held in the next subsequent semester(s). In such cases, his/her internal marks in those subject(s) will remain same as those he obtained earlier. The newly secured letter grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

12.3. A Student shall be declared successful or 'passed' in any Mandatory (non-credit)Subject /Course, by appearing and pass in the examination conducted by the institute like credit courses and fulfill minimum attendance requirement.

12.4. 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, Number of Credits, Grade earned etc.), credits earned, SGPA and CGPA.

13. Declaration of Results :

13.1 Computation of SGPA and CGPA are done using the procedure listed in Item no.11.6 – 11.10.

13.2 For Final % of Marks equivalent to the computed final CGPA, the following formula may be used:

% of Marks = (Final CGPA – 0.5) X 10

14. Revaluation and Re-Counting :

14.1 A student can apply for re-counting for the appeared theory subjects within the specified tiemperiod given by controller of examinations.

14.2 A student can apply for revaluation through prescribed application to the controller of examinations within specified time period; however the student can apply revaluation of the answer scripts not exceeding two theory subjects in a semester.

15. Award of Degree under CBCS :

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

i) Pursued a course of study for not less than four academic years and not more than eight academic years.

ii) Register for 160 credits and secure 160 credits. A student will be eligible to get B.Tech. Degree with Honours, if he/she completes an additional 20 credits through Massive Online Open Courses (MOOCs).

iii) Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech course unless extension is granted for a further period by College Academic Council (CAC) to complete the course.

15.2 A student who qualifies for the Award of the Degree as per **item 13.2** shall be placed in the following classes.

Award of Division

S.No.	Division	CGPA
1.	First class with Distinction	$\geq$ 7.5
2.	First Class	$\geq$ 6.5 but less than 7.5
3.	Second Class	$\geq$ 5.5 but less than 6.5
4.	Pass Class	$\geq$ 5 but less than 5.5

15.3 A student with final CGPA (at the end of the Course) < 5 will not be eligible for the Award of the Degree.

16. Withholding of Results :

If the student has not paid fees to University/College at any stage or has pending dues against his/her name due to any reason whatsoever, or if any case of indiscipline is pending against him/her, the result of the student may be withheld, and he/she will not be allowed to go into the next higher semester. The Award or issue of the Degree may also be with held in such cases.

17. Transitory Regulations :

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 readmission to the same subject/course (or equivalent subjects/courses, as the case may be), and same Professional Electives/Open Electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of his I year I Semester).

Details of Transitory regulations :

Admission with advance standing : These may arise in the following cases :

1. When a student seeks transfer from other college to Jayamukhi Institute of Technological Sciences (JITS) and desires to pursue study at JITS in an eligible branch of study.
2. When students of JITS get transferred from on eregulation to another regulation or from previous syllabus to revised syllabus.
3. When as student after long discontinuity rejoins the college to complete his Programme of study for the award of a degree.

I. Transitory Regulations : For students admitted under advance standing, these transitory regulations will provide the modus iperandi. At the time of such admission, basd on the Programme pursued (case by case).

1. Equivalent courses completed by the student are established by the Chairman, BOS concerned.
2. Marks/Credits are tranferred for all such equivalent courses and treated as successfully cleared in the Programme study prescribed by JITS.
3. A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuing at JITS.
4. Marks obtained in the previous systtem if the case be, are converted to grades and accordingly CGPA is calculated. All other modalities and

regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is merged.

5. The students those who are on rolls to be provided one chance to write the internal exams in the **subjects not studied,** as per the clearance letter (equivlence) issued by Chairman, BOS.
6. After the revision of the regulations, the students of the previous batches will be given two subsequent chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits within stipulated period.
7. When the student seeks admission into the course,his/her eligibility to the year of admission is based on his eligibility criteria of the previous institution where he studied earlier, subject to the ratification of TSCHE and JNTUH. Once he/she admitted after scrtiny the rules of JITS applicable from the date of admission.
8. When the student seeks admission from JNTUH regulations to autonomous regulations, the eligibility criteria to the year of admission is based on the eligibility criteria of JNTUH regulations for the batch in which he/she admitted. After taking admission the autonomous regulations are applicable for the subsequent promotion to the next academic year.

II. Transitory Regulations for the students who have discontinued the programme :

1. 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 readmision to the same subject/course (or equivalent subjects/ courses, as the case may be).
2. The student is permitted to register for ProfessionalElectives/Open Electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of his I year I Semester).

Scope :

1. The academic regulations should be read as a whole, for the purpose of any interpretation.
2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
3. JITS may change or amend te academic regulations, corse structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dater of notified.

18. General :

i. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

ii. Where the words “subject” or “subjects”, occur in these regulations, they also imply “course” or “courses”.

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

iv. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, College Academic Council is final.

Note: The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College Authorities.

Academic Regulations for B.Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II-Year from the academic year 2019-2020 and on wards)

1. The students admitted to B.Tech. Programme under Lateral Entry Sceme will pursue the course for not less than three academic years and not more than six academic years.

2. The students have to acquire all credits (Total 120) from II to IV year of B.Tech. Program (Regular) for the award of the degree. Register all credits and secure all credits.

3. A student will be eligible to get B.Tech. Degree with Honours, if he/she completes an additional 20 credits through Massive Online Open Courses (MOOCs).

4. A student can earn 2 credits by active participation in NSS. As no grade is defined for these 2 credits they are not included in CGPA calculations. Based on their participation in NSS acibities, the student can earn maximum of 100 actibity points.

5. Student, who fails to fulfill the requirements for the award of the degree in six consecutive academic years from the year of admission, shall forfeit his seat unless extension is granted by the College Academic Council to complete the Programme for a further period.

6. The same attendance regulations are to be adopted as that of B.Tech. (Regular).

7. Promotion Rules :

S.No.	Promotions	Conditions to be fulfilled
1.	Second year first semester to second year second semester	Regular course of study of second year first semester
	Second year second semester to third year first semester	(i) Regular course of study of second year second semester (ii) Must have secured atleast 24 credits out of 40 credits i.e., 60% credits upto second year second semester from all relevant regular and supplementary examinations, whether the student takes those examinations or not
2.	Third year first semester to third year second semester	Regular course of study of third year first semester
	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester (ii) Must have secured atleast 48 credits out of 80 credits i.e., 60% credits upto third year second semester from all relevant regular and supplementary examinations, whether the student takes those examinations or not
	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester

8. All other regulations as applicable for B.Tech. IV year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)

Note : The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College Authorities.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper Conduct	Punishment
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 of related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in 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 candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidtes 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, programmale calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinationsand project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester. The Hall Ticket of the candidate is to be canelled.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project rork) already appeared and shall not be allowed to appear for exminations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. the continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an 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 out 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 the performance in that subject and all other subjects the candidate has already appeared including practical examinationsand project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate 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 organizes a walkout or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible represenation, assaults the officer-incharge, 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 whichresult in damage to or destrction of property in the examinagion hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	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 candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates 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.
7.	Leaves the exam hall taking away answer script or intentially tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8.	Possess any lethal weapon or fire-arm in the Examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits the seat. Peson(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 candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester.
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 candidate has already appeared including practical examinations and project work of that Semester/ year examination.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be referred to Examination Result Processing Committee (ERPC) further action to award suitable punishment.	

ANNEXURE

NSS ACTIVITY EVALUATION PROCEDURE

The college shall consolidate the activity points earned by the students from his/her first year on an academic year basis and enter the consolidated marks at the end of the student's course completion. For lateral entry students the marks will be consolidated from third semester to the end of the student course completion. The consolidated marks will be evaluated for max of 100 marks as per the evaluation sheet for lateral entry students. The college online portal shall be open for a specific time period with prior intimation to enter the activity marks. All documental proof for awarding the activity marks shall be submitted and verified by NSS authorities of the college before awarding the points to the student. Each activity points earned will be evaluated as one mark during final consolidaton of marks.

THE MAIN ACTIVITY SEGMENTS ARE LISTED BELOW

1. National Initiatives
2. Sports and Games
3. Cultural Activities
4. Leadership and management

The following table gives list of activities under each of these segments, the level of achievement, activity points, evidence needed to assign the points and the minimum duration needed for certain activities.

Additional Activities will be updated on regular basis as per the NSS hand book issued by the state government NSS unit.

Activity Head	Sl. No.	Activity	Achievement levels and Assigned Activity points					** Approval Documents	Maximum points
		* Level	I	II	III	IV	V		
National Initiatives Participation	1.	Cleanliness Drive	5	10	15	20	25	a & b	25
	2.	Children Aware--ness Programme	5	10	15	20	25	a & b	25
	3.	Health Awareness Programme	5	10	15	20	25	a & b	25
	4.	Environment Prot--ection Programme	5	10	15	20	25	a & b	25

Activity Head	Sl. No.	Activity	Achievement levels and Assigned Activity points					** Approval Documents	Maximum points
Sports and Games		* Level	I	II	III	IV	V		
	1.	Organised by NCC or Government Body For participation	5	10	15	20	25	a & b	25
		First Prize	10	15	20	25	30	a,b & c	30
		Second Prize	8	13	18	23	28	a,b & c	28
		Third Prize	6	11	16	21	26	a,b & c	26
Cultural Activities	1.	Music	5	10	15	20	25	a	25
	2.	Performing Arts	5	10	15	20	25	a	25
	3.	Leterary Arts	5	10	15	20	25	a	25
Leadership and Management	1.	Free Medical Camp	5	10	15	20	25	a,b,c & d	25
	2.	Rural Assistance Camp	5	10	15	20	25	a,b,c & d	25
	3.	Education & Career Counselling Camp	5	10	15	20	25	a,b,c & d	25
	4.	NSS special Camp	5	10	15	20	25	a,b,c & d	25
	5.	Drives organised by Govt. bodies for Social Awareness	5	10	15	20	25	a,b,c & d	25
	6.	Social Survey Camp by NSS							

* Level I - College Events

* Level II - Zonal Events

* Level III - State / University Events

* Level IV - National Events

* Level V - International Events

** Approval Documents : (a) Certificate, (b) Letter from Authorities, (c) Appreciation recognition Letter, (d) Documentary evidence.

MOOCS EVALUATION PROCEDURE

A student will be eligible to get under graduatedegree with honours if he/she complete an additional 20 credits acquired through MOOCS as directed by AICTE and UGC. The additional 20 credits can be earned by the student by successfully registering and completing the courses offered by the following government agency.

1. SWAYAM
2. UGC
3. NPTEL
4. IGNOU
5. NIOS
5. CEC

On successful completion of the course, the student have to submit his/her certificates issued by the above government agency to review committee framed by Principal and HODs. The approval of the review committee for each course will earn 2 credits to his/her curriculum. Additionalcourses will be updated on regular basis as per the AICTE and UGC guidelines.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2018-2019 onwards)

I YEAR - I SEMESTER **I SEMESTER**

S.No.	Subject Code	Subject	Marks		L	T	P	Credits
			Internal	External				
1	J1001	Mathematics-I	30	70	3	1	0	4
2	J1007	Engineering Physics	30	70	3	1	0	4
3	J1008	Engineering Chemistry	30	70	3	1	0	4
4	J1301	Engineering Mechanics	30	70	3	1	0	4
5	J1009	Engineering Physics & Chemistry Lab	30	70	0	0	3	1.5
6	J1303	Engineering Workshop	30	70	1	0	3	2.5
		Induction Programme						
		Total Credits			**13**	**4**	**6**	**20**

I YEAR - II SEMESTER **II SEMESTER**

S.No.	Subject Code	Subject	Marks		L	T	P	Credits
			Internal	External				
1	J2002	Mathematics-II	30	70	3	1	0	4
2	J2011	English	30	70	2	0	0	2
3	J2202	Basic Electrical & Electronics Engineering	30	70	2	1	0	3
4	J2302	Engineering Graphics	30	70	1	0	4	3
5	J2501	Programming for Problem Solving	30	70	3	1	0	4
6	J2502	Programming for Problem Solving Lab	30	70	0	0	3	1.5
7	J2203	Basic Electrical & Electronics Engineering Lab	30	70	0	0	3	1.5
8	J2012	English Language & communication Skills Lab	30	70	0	0	2	1
		Total Credits			**11**	**3**	**12**	**20**

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II YEAR - I SEMESTER **III SEMESTER**

S.No.	Subject Code	Subject	Marks		L	T	P	Credits
			Internal	External				
1	J3005	Probability Distribution & Complex Variables	30	70	3	1	0	4
2	J3305	Engineering Thermodynamics	30	70	3	0	0	3
3	J3306	Mechanics of Solids	30	70	3	0	0	3
4	J3307	Material Science and Metallurgy	30	70	3	0	0	3
5	J3309	Mechanics of Fluids & Hydraulic Machinery	30	70	3	1	0	4
6	J3308	Material Testing and Metallurgy Lab	30	70	0	0	3	1.5
7	J3310	Mechanics of Fluids & Hydraulic Machinery Lab	30	70	0	0	3	1.5
		Total Credits			**15**	**2**	**6**	**20**
8	JMC01	Environmental Science	30	70	2	0	0	0

II YEAR - II SEMESTER **IV SEMESTER**

S.No.	Subject Code	Subject	Marks		L	T	P	Credits
			Internal	External				
1	J4E02	Managerial Economics & Financial Analysis	30	70	3	0	0	3
2	J4313	Thermal Engineering - I	30	70	3	1	0	4
3	J4314	Kinematics of Machinery	30	70	3	1	0	4
4	J4315	Manufacturing Processes	30	70	3	0	0	3
5		**Open Elective - I**	30	70	3	0	0	3
6	J4316	Manufacturing Processes Lab	30	70	0	0	3	1.5
7	J4317	Machine Drawing Practice	30	70	0	0	3	1.5
		Total Credits			**15**	**2**	**6**	**20**
8	JMC02	Gender Sensitization	100	-	2	0	0	0

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COURSE STRUCTURE
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III YEAR - I SEMESTER **V SEMESTER**

S.No.	Subject Code	Subject	Marks		L		P	Credits
			Internal	External				
1	J5E01	Management Science	30	70	3	0	0	3
2	J5318	Dynamics of Machinery	30	70	3	0	0	3
3	J5319	Thermal Engineering - II	30	70	3	1	0	4
4	J5321	Manufacturing Technology	30	70	4	0	0	4
5	J5333 J5334 J5335	**Professional Elective - I** 1. Finite Element Method 2. Robotics 3. Production Planning and Control	30	70	3	0	0	3
6	J5320	Thermal Engineering Lab	30	70	0	0	3	1.5
7	J5322	Manufacturing Technology Lab	30	70	0	0	3	1.5
		Total Credits			**16**	**1**	**6**	**20**
8	JMC03	Constitution of India	30	70	2	0	0	0

III YEAR - II SEMESTER **VI SEMESTER**

S.No.	Subject Code	Subject	Marks		L	T	P	Credits
			Internal	External				
1	J6323	Design of Machine Elements	30	70	3	0	0	3
2	J6324	Heat Transfer	30	70	3	1	0	4
3	J6336 J6337 J6338	**Professional Elective - II** 1. Refrigeration and Air Conditioning 2. Advanced Strength Materials 3. Theory of Metal Cutting	30	70	3	0	0	3
4	J6339 J6340 J6341	**Professional Elective - III** 1. Operation Research 2. Tribology 3. Additive Manufacturing	30	70	3	0	0	3
5		**Open Elective - II**	30	70	3	0	0	3
6	J6325	Heat Transfer Lab	30	70	0	0	3	1.5
7	J6326	Production Drawing Practice	30	70	0	0	3	1.5
8	J6380	Internship	100	-	0	0	2	1
		Total Credits			**15**	**1**	**8**	**20**

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

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COURSE STRUCTURE

(Applicable for the batches admitted from A.Y. 2018-2019 onwards)

IV YEAR - I SEMESTER **VII SEMESTER**

S.No.	Subject Code	Subject	Marks		L	T	P	Credits
			Internal	External				
1	J7327	Metrology and Instrumentation	30	70	2	1	0	3
2	J7329	CAD / CAM	30	70	3	0	0	3
3		**Professional Elective - IV**						
	J7342	1. Power Plant Engineering						
	J7343	2. Automation in Manufacturing	30	70	3	0	0	3
	J7344	3. Mechanics of Composite Materials						
4		**Open Elective - III**	30	70	3	0	0	3
5		**Open Elective - IV**	30	70	3	0	0	3
6	J7328	Metrology and Instrumentation Lab	30	70	0	0	3	1.5
7	J7330	CAD / CAM Lab	30	70	0	0	3	1.5
8	J7381	Mini Project	100	--	0	0	4	2
		Total Credits			**14**	**1**	**10**	**20**

IV YEAR - II SEMESTER **VIII SEMESTER**

S.No.	Subject Code	Subject	Marks		L	T	P	Credits
			Internal	External				
1		**Professional Elective - V**						
	J8345	1. Unconventional Machining Processes						
	J8346	2. Automobile Engineering	30	70	3	0	0	3
	J8347	3. Mechanical Vibrations						
2		**Professional Elective - VI**						
	J8348	1. Computational Fluid Dynamics						
	J8349	2. Theory of Elasticity	30	70	3	0	0	3
	J8350	3. Plant Layout & Material Handling						
3		**Open Elective - V**	30	70	3	0	0	3
4	J8382	Technical Seminar	100	--	0	1	0	1
5	J8383	Comprehensive Viva-Voce	100	--	0	0	4	2
6	J8384	Major Project	30	70	0	0	16	8
		Total Credits			**9**	**1**	**20**	**20**
7	J8385	**NSS***			-	-	-	2*

***Refer Academic Regulation, Item No. 01 Sub Section (ii)**

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
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LIST OF OPEN ELECTIVES OFFERED AT COLLEGE LEVEL

S. No.	Subject Code	Subject
1	J_150	Remote Sensing & GIS
2	J_151	Traffic Engineering and Transportation Planning
3	J_152	Disaster Preparedness & Planning
4	J_153	Environmental Imapact Assessment
5	J_219	Control Systems
6	J_223	Renewable Energy Sources
7	J_224	Energy Storage Systems
8	J_238	Industrial Electricals Systems
9	J_249	Electrical Engineering Materials
10	J_250	Neural Networks & Fuzzy Logic
11	J_351	Basic Mechanical Engineering
12	J_352	Applied Mechanics
13	J_353	Material Science
14	J_354	Basics of Thermodynamics
15	J_355	Strength of Materials
16	J_356	Modeling and Simulation of manufacturing systems
17	J_357	Mechatronics
18	J_358	Finite Element Analysis
19	J_359	Nano Technology
20	J_402	Signals and Systems
21	J_409	Digital System Design
22	J_410	Electromagnetic Waves and Transmission Lines
23	J_414	IC Applications
24	J_415	Digital Signal Processing
25	J_418	Bio Medical Electronics
26	J_419	Computer Organization
27	J_422	Linear Control Systems
28	J_424	Microprocessors and Microcontrollers

29	J_434	Image and Video Processing
30	J_437	Embedded Systems
31	J_447	Wireless Sensor Networks
32	J_454	Microprocessors and Interfacing
33	J_456	Digital Image Processing
34	J_518	Database Management Systems
35	J_528	Computer Networks
36	J_529	Machine Learning
37	J_538	Data Mining
38	J_539	Cryptography & Network Security
39	J_547	Cloud Computing
40	J_551	INternet of Things (loT)
41	J_553	Soft Computing
42	J_555	Data Science & Big Data Analytics
43	J_556	Natural Language Processing
44	J_559	Semantic Web & Social Networks
45	J_560	E-Commerce
46	J_E01	Management Science
47	J_E02	Managerial Economics and Financial Analysis
48	J_E03	Total Quality Management
49	J_E04	Global Marketing
50	J_E05	Green Marketing
51	J_E06	Intellectual Property Rights
52	J_E07	Supply Chain Management
53	J_E08	Statistical Quality Control
54	J_E09	Financial Statement Analysis and Reporting
55	J_E10	Micro Small Medium Enterprises Management
56	J_E11	Entrepreneurship Development
57	J_E12	Organizational Behaviour
58	J_E13	Industrial Management
59	J_E14	Production and Operations Management
60	J_E15	Economic Policies of India

Note : ' _ ' represents the applicable semester code

Note : The syllabus of Open Elective subjects is kept available in the Departments and website

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J1001) MATHEMATICS - I

B.TECH. I YEAR – I SEM **L T P C**

3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level

Objectives: The Students able to learn

1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form.
4. Concept of Sequence.
5. Concept of nature of the series.
6. Geometrical approach to the mean value theorems and their application to the mathematical problems.
7. Evaluation of surface areas and volumes of revolutions of curves.
8. Evaluation of improper integrals using Beta and Gamma functions.
9. Partial differentiation, concept of total derivative Finding maxima and minima of function of two and three variables.

UNIT-I

Matrices: Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss-elimination method; Gauss Seidel Iteration Method.

UNIT-II

Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV

Calculus: Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V

Multivariable calculus (Partial Differentiation and applications): Definitions of Limit and continuity.

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence &independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

Text books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36thEdition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley &Sons,2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.

References:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

***Outcomes*:** After learning the contents of this paper the student must be able to

1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations.
2. Find the Eigenvalues and Eigen vectors.
3. Reduce the quadratic form to canonical form using orthogonal transformations.
4. Analyse the nature of sequence and series.
5. Solve the applications on the mean value theorems.
6. Evaluate the improper integrals using Beta and Gamma functions. Find the extreme values of functions of two variables with/ without constraints.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J1007) ENGINEERING PHYSICS

B.TECH. I YEAR – I SEM **L T P C**

3 1 0 4

Objectives :

1. Enable the student to connect the historical development of quantum mechanics and learn the basic principles of quantum mechanics and employs the Bloch's theorem to draw the band structure of solids on the basis of Kronig Penny model.
2. The students learn basic theory of semiconductors and principles and operations of optoelectronic devices.
3. The Students to understand the basic properties of light, Concepts of LASER and it's engineering applications.
4. Enable the students to learn the basic principles of dielectrics, magnetic superconductors and their engineering applications.
5. Enable the students to learn about the types of oscillation, mechanics, which helps in analyzing and solving the engineering problems.

UNIT-I

Quantum Mechanics: Introduction to quantum mechanics**,** Wave nature of the particle, de-Broglie's hypothesis, Davisson and Germer's experiment, GP Thompson experiment, Heisen berg's uncertainty principle, Schrodinger time independent wave equation, Particle in one dimensional box.

Band theory of Solids: Electron in periodic potential – Bloch theorem**,** Kronig–Penny Model, Brillion zone concept, Effective mass of an electron, Origin of energy band formation-Classification of materials.

UNIT-II

Semiconductor Physics: Introduction to intrinsic and extrinsic semiconductors, Carrier concentration in conduction band and valancy band of intrinsic and extrinsic semiconductor, Fermi level, Effect of carrier concentration and temperature on Fermi level, Hall Effect- Applications of semiconductors.

Semiconductor Optoelectronics: Radative and Non-radative recombination mechanisms in semiconductors, Formation of PN junction diode-V-I characteristics, Zener diode - characteristics, Solar cell and LED- Construction and working mechanism.

UNIT-III

Optics: Huygens' principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment,

Newton's rings, Michelson interferometer, Farunhofer diffraction from a single slit, Diffraction grating and resolving power.

Lasers :Introduction-characteristics of lasers, absorption, spontaneous emission, stimulated emission, Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, Ruby laser, He-Ne laser, Semiconductor diode laser, applications of lasers in science, Engineering and Medicine.

UNIT-IV

Dielectric Materials: Introduction-Types of Polarizations, derivation for electronic and ionic polarizabilities, internal fields in solids, Clausius Mossotti equation, Ferro electricity, structure of $BaTiO_{3,}$ piezo-electricity.

Magnetic Materials: Introduction-origin of magnetic moment, Bohr Magneton, classification of Dia, Para and Ferro magnetic materials, Hysteresis curve, Soft and hard magnetic materials; Superconductivity- properties, BCS theory, Type –I &II Superconductors-Applications.

UNIT-V

Oscillations, waves: Simple harmonic motion, Damped and forced simple harmonic oscillator, damped harmonic oscillator – heavy, critical and light damping quality factor, forced mechanical oscillators, mechanical impedance, steady state motion of forced damped harmonic oscillator.

Mechanics: Motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion.

Text Books :

1. Introduction to Quantum Physics-Eisberg and Resnick.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc.
3. H.J. Pain, The Physics of vibrations and waves.
4. Quantum Mechanics- Decker.
5. Ian G. Main, Oscillations and waves in physics.

References :

1. Engineering Physics, P.K Palanisamy, Scitech Publications.
2. Applied Physics- Dr. N Chandra Shaker and P. Appal Naidu.
3. Applied Physics for Engineers- P. Madhusudana rao, Academic Publishing Company.
4. Engineering Physics, V. Rajandran, Tata mc. Graw Hill Book Publishers.
5. Introduction to Mechanics — MK Verma.

Outcomes :

1. The student learns about solving engineering solutions employing the quantum mechanical concepts.
2. The students learns about the physics of semiconductor materials and along with their applications in science and engineering.
3. The student learns about the construction, working and applications of LASER in engineering.
4. The students get exposure to dielectric and magnetic materials and their engineering applications.
5. The students learn about theory of waves and oscillation and mechanics of rigid bodies for engineering applications.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J1008) ENGINEERING CHEMISTRY

B.Tech I-Year I-Semester **L T P C**

3 1 0 4

Objectives :

1. To achieve the knowledge about various kinds of Orbitals & Splitting patterns.
2. To know about the water quality and its parameters, learning the knowledge in the assessment of water quality and purification.
3. To achieve the knowledge about various kinds of Electrochemical cells and batteries and corrosion phenomenon.
4. To understand the reactions, mechanism and stereochemistry of organic molecules.
5. Understand the principle, instrumentation and applications of Spectroscopic techniques.

UNIT-I

Molecular structure and Theories of Bonding: Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2,O_2 and F_2 molecules. π molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metalion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT-II

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. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT-III

Electrochemistry and corrosion: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

UNIT-IV

Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation alanalysis of n- butane. Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1, S_N2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid. Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$& $NaBH_4$. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT-V

Spectroscopic techniques and applications: Principles of spectroscopy, selection rules and applications of electronic spectroscopy. vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

Text books :

1. Text Book of Engineering Chemistry by A.Jayashree, Wiley publications, New Delhi.
2. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, New Delhi (2010).
3. Text Book of Engineering Chemistry by Shashi Chawla.
4. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, New Delhi. (2016).
5. Text Book of Engineering Chemistry by C. Parameshwara Murthy. B.S. Publications.
6. Text Book of Engineering Chemistry by Y. Bharathi kumari and Jyotsna Cherikuri, VGS Publications.

Outcomes .5:

1. Students will gain the basic knowledge of atomic and molecular orbitals & Splitting patterns.
2. They can understand the basic properties of water and its usage in domestic and industrial purposes.
3. To gain the knowledge about the Electrochemical cells, batteries and corrosion phenomenon.
4. They learn about organic reactions and the stereochemistry of organic molecules.They can predict potential applications of spectroscopy and practical utility in order to become good engineers and entrepreneurs.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J1301) ENGINEERING MECHANICS

B.TECH. I YEAR – I SEM **L T P C**

3 1 0 4

Course Objectives: The objectives of this course are to

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium.
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the Centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections.
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
5. Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations.

UNIT-I :

Introduction to Engineering Mechanics - Force Systems : Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT-II:

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack.

Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

UNIT-III :

Area Moment of Inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.

Mass Moment of Inertia : Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT-IV:

Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and

constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT-V:

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.

TEXT BOOKS :

1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition / New age International Publishers.
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics.

REFERENCE BOOKS :

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.

Course Outcomes: At the end of the course, graduates will be able to

1. Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
2. Solve problem of bodies subjected to friction.
3. Find the location of centroid and calculate moment of inertia of a given section.
4. Evaluate the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J1009) ENGINEERING PHYSICS AND CHEMISTRY LAB

B.TECH. I YEAR – I SEM **L T P C**

0 0 3 1.5

Objectives :

This course on Physical Sciences lab has been designed with 18 experiments in Physics and Chemistry. The objective of the course is that the student will have exposure to various experimental skills which is very essential for an engineering student. The experiments are selected from various areas of physics and chemistry like Physical Optics, Lasers, Fiber optics, waves and oscillations, semiconductors, Electricity, Conductometry, Potentiometry, etc... The student is also exposed to various tools like Screw Gauge, Vernier callipers, Physical balance, Spectrometer, Microscope, Viscometer, and stalagmometer, etc.

PHYSICS LAB (CYCLE-1)

(Any Six Experiments compulsory)

1. Determination of Eenergy gap of semiconductor material of p-n junction diode.
2. Determination of frequency of electrical vibrator by using Melde's experiment.
3. Determination of wavelength of LASER by using diffraction grating.
4. Determination of rigidity modulus of a given wire using Torsional pendulum.
5. R-C circuit analysis.
6. Determination of Numerical aperture of a given optical fiber.
7. Determination of the radious of curvature of plano-convex lens by forming Newton's rings.
8. LED-characteristics.

CHEMISTRY LAB (CYCLE -2)

(Any Six Experiments compulsory)

1. Determination of total hardness of water by complexometric method using EDTA.
2. Estimation of an HCl by Conductometric titrations.
3. Estimation of Acetic acid by Conductometric titrations.
4. Estimation of HCl by Potentiometric titrations.
5. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
6. Synthesis of Aspirin and Paracetamol.
7. Thin layer chromatography calculation of R_f values. egortho and para nitro phenols.
8. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal.
9. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
10. Determination of surface tension of a give liquid using stalagmometer.

Laboratory Manuals:

1. Laboratory Manual Of Engineering Physics By Dr. Y.Aparna And Dr K. Venkateswara Rao (V.G.S Publishers) Practical Engineering Chemistry by K. Mukkanti, etal 'BS' Publications, Hyderabad.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J1303) ENGINEERING WORKSHOP

B.TECH. I YEAR – I SEM **L T P C**
1 0 3 2.5

Pre-requisites: Practical skill
Course Objectives :
1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.

Demonstration: Plumbing, Power tools: Power hacksaw, Table mounted circular saw, Thickness planer, Bench drilling machine.

Workshop Practice: (Two exercises are required to perform from each trade)
1. Fitting**.**
2. Carpentry**.**
3. Tin Smithy**.**
4. House wiring**.**
5. Black Smithy.
6. Foundry.
7. Welding.

Course Outcomes: At the end of the course, the student will be able to:
1. Study and practice on machine tools and their operations.
2. Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry and house wiring.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

TEXT BOOKS:
1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech.
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS :
1. Workshop Practice /B. L. Juneja / Cengage.
2. Workshop Manual / Venkat Reddy/ BSP.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2002) MATHEMATICS - II

B.TECH. I YEAR – II SEM **L T P C**

3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level

Objectives: The Students able to learn

1. Methods of solving the differential equations of first and higher order.
2. Evaluation of multiple integrals and their applications.
3. The physical quantities involved in engineering field related to vector valued functions.
4. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

UNIT-I

First Order ODE: Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II

Ordinary Differential Equations of Higher Order: Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sinax, casax polynomials in x, $e^{ax}v(x)$ and xv(x) ; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III

Multivariable Calculus (Integration): Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

UNIT-IV

Vector Differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Text Books :

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons,2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002.

References :

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes.
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

Outcomes: After learning the contents of this paper the student must be able to

1. Identify whether the given differential equation of first order is exact or not.
2. Solve higher differential equation and apply the concept of differential equation to real world problems.
3. Evaluate the multiple integrals and apply the concept to find areas and volumes.
4. Evaluate the line, surface and volume integrals and converting them from one to another.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2011) ENGLISH

B.TECH. I YEAR – II SEM **L T P C**
2 0 0 2

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, communicative and critical thinking 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 for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be 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, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.*

Objectives **:** The course will help to

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

UNIT –I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation —The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures - Use of Phrases and Clauses in Sentences-Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension.

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning.

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence.

UNIT –IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English.

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension**-** Intensive Reading and Extensive Reading.

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Technical Vocabulary and their usage
Grammar : Common Errors in English.

Reading : Reading Comprehension-Exercises for Practice.

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

Text Books :

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References :

2. Swan, M. (2016). Practical English Usage. Oxford University Press.
3. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
4. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
5. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
6. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
7. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

Outcomes : Students should be able to

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2202) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

B.TECH. I YEAR – II SEM **L T P C**

2 1 0 3

***Objectives* :**

1. To understand the concepts of Basis Electrical Engineering parameters, quantities, and network theorems.
2. To analyze the steady state analysis of AC and DC circuits.
3. To Study the construction operation and analysis of transformers, DC and AC machines.
4. To Study the Operational Characteristics of Diodes and Rectifier Circuits.
5. To Study the Operational Characteristics of transistor, characteristics and its applications.

UNIT- I

Electrical Circuits: Circuits concept, R-L-C Parameters, Voltage and Current sources, Source Transformation, V–I relationship for Passive elements, Kirchoff's Laws, Network reduction techniques – series, parallel, series parallel, star/delta transformations, Nodal Analysis, Mesh analysis with DC excitations.

Network Theorems - Thevenin's, Norton's, Maximum Power Transfer, Superposition, Reciprocity Theorems with DC excitation.

UNIT- II

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, j-notation, complex and Polar forms of representation.

UNIT- III

D.C.Machines: Constructional features, Methods of Excitation, E.M.F. Equation and Applications, Torque development in D.C motor, Characteristics of DC motors, losses, Efficiency, Swinburne's test, Speed control of DC Shunt motors.

Single Phase Transformers: Construction and principle of operation, Development of No Load & On Load Phasor diagrams (Basic fundamentals only).

3-Phase Induction Motor: Constructional features, Principle of Operation (Basic fundamentals only).

UNIT- IV

P-N Junction Diode – Qualitative theory of P-N Junction, P-N Junction diode, V-I characteristic(Forward and Reverse), Temperature dependence, Ideal versus practical, Static and dynamic resistances.

Rectifiers and Filters - The P-N junction as a rectifier - A Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier, Filters-Inductive and Capacitive with qualitative analysis.

UNIT- V

Bipolar Junction Transistor (BJT) - Construction, Principle of Operation, CB, CE and CC configurations.

Junction Field Effect Transistor - Construction, Principle of Operation, V-I Characteristic, Comparison of BJT and FET.

Zener Diode and SCR Devices- Zener diode characteristics, Use of Zener diode as simple regulator, Breakdown Mechanisms in Zener diode, Principle of Operation of SCR.(Basic fundamentals only).

Text Books **:**

1. Electronic Devices and Circuits – R.L. Boylston and Louis Nashelsky, PEI/ PHI, 9th Ed, 2006.
2. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
3. Electrical Machines – by P.S.Bimbra.

References **:**

1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
2. Electronic Devices and Circuits -- K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
3. Electrical Machines – by J.B.Gupta.
4 Network Theory by N.C.Jagan & C.Lakshminarayana, B.S. Publications.
5 Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2302) ENGINEERING GRAPHICS

B.TECH. I YEAR – II SEM **L T P C**

1 0 4 3

Pre-requisites: Nil

Course objectives :

1. To Use various engineering drawing instruments along with learn the basics of drawings, dimensioning, scales and conic sections like ellipse, parabola and hyperbola.
2. To Learn projections of points, lines and plane viewed in different positions.
3. To Learn projections of solids and sections of solids in different positions.
4. To impart knowledge of development of surfaces and intersections is most useful of real time applications in industry.
5. Attain the concept of isometric, orthographic projections.

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder.

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. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions.

Introduction to CAD: (For Internal Evaluation Weightage only): Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.

TEXTBOOKS :

1. Engineering Drawing N.D. Bhatt / Charotar.
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford.

REFERENCE BOOKS :

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill.
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers.

Course Outcomes :

1. Select, construct and interpret appropriate drawing scales as per the situation and able to draw simple curves.
2. Graduates are able to draw orthographic projections of points ,lines and planes.
3. Able to draw the orthographic projections of solids and sections of solids.
4. Layout development of solids for practical situations along with able to draw sections of solids.
5. Comprehend the isometric projections.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2501) PROGRAMMING FOR PROBLEM SOLVING

B.TECH. I YEAR – II SEM **L T P C**

3 1 0 4

Course Objectives :

1. To introduces the basics of computers and information technology.
2. To educate problem solving techniques.
3. To impart programming skills in C language.
4. To practice structured programming to solve real life problems.
5. To study the concepts of Assembler, Macro Processor, Loader and Linker.

UNIT-I

History and Classifications of Computers – Components of a Computer – Working Principle of Computer – Hardware – Software and its Types – Applications of Computers –Network and its Types – Internet and its services – Intranet– Extranet – Generations of Programming Languages Introduction to Number System.

UNIT-II

Problem solving techniques – Program development life-cycle – Algorithm – Complexities of Algorithm – Flowchart – Pseudo code. Introduction to C –C Program Structure – C tokens: Keyword, Identifiers, Constants, Variable, Data types (simple and user-defined) – Operators and its types – Operator Precedence – Expression Evaluation – Type Conversion – Input/output operations.

UNIT-III

Branching Statements – Looping Statements – Arrays – Multidimensional arrays. Functions: Function Prototype, Passing Arguments to Function – Call by Value and Call by Reference – Nested function call – Library Functions – User-defined Functions – Recursion. Strings – String I/O functions, String Library functions – Storage classes.

UNIT-IV

Structures – Arrays and Structures – Nested structures – Structure as Argument to functions– Union Pointers – Declaration, Initialization and Accessing Pointer variable – Pointers and arrays – pointers as argument and return value – Pointers and strings - pointers and structures.

UNIT-V

Introduction to File Concepts in C – File types – I/O operations on files – File modes – Random access to files – Command line arguments. Dynamic Memory

Allocation: MALLOC, CALLOC, FREE, REALLOC Introduction to preprocessor – Macro substitution directives – File inclusion directives –Compiler Control directives – Miscellaneous directives.

Text Books :

1. J. B. Dixit, "Computer Fundamentals and Programming in C", Firewall Media, 2009.
2. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Sixth edition, 2012.

Reference Books :

1. Ashok N Kamthane, "Computer Programming", Pearson education, Second Impression, 2008. 2.Venugopal.K and Kavichithra.C, "Computer Programming", New Age International Publishers, First Edition, 2007.
3. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
4. Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.
5. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.

Course Outcomes :

1. Know the fundamentals of computers.
2. Uunderstand applying logical skills for problem solving.
3. Learn C programming language concepts.
4. Apply C programming language concepts for problem solving.
5. Gain knowledge in using memory management techniques in c programming.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2502) PROGRAMMING FOR PROBLEM SOLVING LABORATORY

B.TECH. I YEAR – II SEM **L T P C**

0 0 3 1.5

Course Objectives :

1. To study and understand the use of OS commands.
2. To expose the undergraduate students to the practical implementation of C Programming concepts.
3. To improve students capability in applying C Programming for problem solving.
4. To make students use effective memory management techniques in programming.
5. To expose students to modular programming concepts in problem solving.

LIST OF EXPERIMENTS :

Week 1 : Study of OS commands.

Week 2 : Study of Compilation and execution of simple C programs.

Week 3 : Basic C Programs.

a. Arithmetic Operations.
b. Area and Circumference of a circle.
c. Swapping with and without Temporary Variables.

Week 4 : Programs using Branching statements

a. To check the number as Odd or Even.
b. Greatest of Three Numbers.
c. Counting Vowels.
d. Grading based on Student's Mark.

Week 5 : Programs using Control Structures

a. Computing Factorial of a number.
b. Fibonacci Series generation.
c. Prime Number Checking.
d. Computing Sum of Digit.

Week 6 : Programs using String Operations

a. Palindrome Checking.
b. Searching and Sorting Names.

Week 7 : Programs using Arrays.

Week 8 : Programs using Functions.

a. Computing nCr.

b. Factorial using Recursion.

c. Call by Value and Call by Reference.

Week 9 : Programs using Structure

a. Student Information System.

b. Employee Pay Slip Generation.

c. Electricity Bill Generation.

Week 10 : Programs using Pointers

a. Pointer and Array.

b. Pointer to function.

c. Pointer to Structure.

Week 11 : Programs using File Operation

a. Counting No. of Lines, Characters and Black Spaces.

b. Content copy from one file to another.

c. Reading and Writing Data in File.

Text Books:

1. J. B. Dixit, "Computer Fundamentals and Programming in C", Firewall Media, 2009.
2. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Sixth edition, 2012.

Course Outcomes :

1. Learn practical implementation of C programming language concepts.
2. Debug and document programs in C.
3. Know usage of logical skills in developing C programs.
4. Apply effective memory management techniques for problem solving.
5. Understand the file management techniques.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2203) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

B.TECH. I YEAR – II SEM **L T P C**

0 0 3 1.5

List of Experiments :

1. Verification of Kirchhoff's Laws.
2. Verification of superposition and Reciprocity Theorems.
3. Verification of Maximum Power transfer theorem.
4. Experimental Determination of Thevenin's theorem.
5. Magnetization characteristics of DC Shunt Generator.
6. Swinburne's Test on DC shunt machine.
7. Brake test on DC shunt motor.
8. OC & SC tests on single phase transformer.
9. PN Junction Diode characteristics (Forward bias, Reverse bias).
10. Zener Diode Characteristics.
11. Transistor CE Characteristics (Input and Output).
12. Rectifier without filters (Full wave & Half wave).
13. Rectifier with filters (Full wave & Half wave).

Note: Student should perform 11 experiments out of 13 experiments. Experiments
7 & 8 are optional.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J2012) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

B.TECH. I YEAR – II SEM **L T P C**

0 0 2 1

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

Objectives :

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize their mother tongue influence.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

The language Lab shall have two parts :

Computer Assisted Language Learning (CALL) Lab.

Interactive Communication Skills (ICS) Lab.

Listening Skills :

Objectives :

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions**.**
3. Students should be given practice in listening to the sounds of the language to be able to recognize them, to distinguish between them to mark stress and recognize and use the right intonation in sentences.
4. Listening for general content.
5. Listening to fill up information.
6. Intensive listening.
7. Listening for specific information.

Speaking Skills :

Objectives :

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
3. Oral practice.
4. Describing objects/situations/people.
5. Role play.
6. Just A Minute (JAM) Sessions.

Reading Skills :

Objectives :

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.
3. Skimming and Scanning the text.
4. Understanding the gist of an argument.
5. Identifying the topic sentence.
6. Inferring lexical and contextual meaning.
7. Understanding discourse features.

Note**:** *The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using '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 equip them with the components of different forms of writing, beginning with the lower order ones. Writing sentences.
3. Use of appropriate vocabulary.
4. Paragraph writing.
5. Coherence and cohesiveness.
6. Narration / description.
7. Note Making.
8. Formal and informal letter writing.
9.

The following course content is prescribed for the Lab.

Exercise – I

CALL Lab:

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

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab :

Understand: Communication at Work Place- Spoken vs. Written language.

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

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab :

Understand: Features of Good Conversation – Non-verbal Communication.

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

Exercise - III

CALL Lab:

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

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

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV

CALL Lab :

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab :

1. Computer Assisted Language Learning (CALL) Lab has to accommodate 40 students with 40 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:

i) Computers with Suitable Configuration.

ii) High Fidelity Headphones.

2. Interactive Communication Skills (ICS) Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

Lab Manuals :

1. ELCS Lab Manual – A Workbook for CALL and ICS Lab Activities. Hyderabad, Orient Black Swan Pvt. Ltd. 2016. Print.
2. Hart, Steve. Nair, Aravind R. and Bhambhani, Veena. EMBARK- English for Undergraduates. Delhi. Cambridge University Press. 2016. Print.

Suggested Software :

1. Cambridge Advanced Learner's dictionary with CD, Fourth edition.
2. Oxford Advanced Learner's Compass, 8th Edition, with CD.
3. Hancock, Mark. English Pronunciation in Use: Intermediate. United Kingdom. Cambridge University Press, 2007.
4. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

References:

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

Outcomes**:** Students will be able to attain

1. Better understanding of nuances of English language through audio- visual experience and group activities.
2. Neutralization of accent for intelligibility Speaking skills with clarity and confidence which in turn enhances their employability skills.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J3005) PROBABILITY DISTRIBUTION & COMPLEX VARIABLES

B.TECH. II YEAR – I SEM **L T P C**

3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level.

Objectives :

To learn

- The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

UNIT-I:

Basic Probability: Probability spaces, conditional probability, independent events, and Bayes' theorem.Random variables: Discrete and continuous random variables, Expectation of Random Variables, Variance of random variables.

UNIT-II:

Probability distributions: Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson approximation to the binomial distribution. Continuous random variables and their properties, distribution functions and density functions, Normal and exponential, evaluation of statistical parameters for these distributions.

UNIT-III:

Testing of Hypothesis: Test of significance: Basic of testing of Hypothesis. Null and alternate Hypothesis, types of errors, level of significance, critical region. Large sample test for single proportion, difference of proportions, single mean, difference of means; small sample tests: Test for single mean, difference of means and test for ratio of variances.

UNIT-IV:

Complex Variables (Differentiation): Limit, Continuity and Differentiation of Complex functions, Analyticity, Cauchy-Riemann equations (without proof), finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT-V:

Complex Variables (Integration): Line integral, Cauchy's theorem, Cauchy's Integral formula, Zeros of analytic functions, Singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem, Conformal mappings, Mobius transformations and their properties.

Course outcomes :

After learning the contents of this paper the student must be able to

- Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
- Analyse the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
- Taylor's and Laurent's series expansions of complex function.

Text Books :

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, 9th Edition, Pearson Publications.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

References :

1. Fundamentals of Mathematical Statistics, Khanna Publications, S C Guptha and V.K. Kapoor.
2. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations.
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2010.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J3305) ENGINEERING THERMODYNAMICS

B.TECH. II YEAR – I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To learn about work and heat interactions, balance of energy between system and its surroundings and to learn about application of First law to various energy conversion devices.
2. To illustrate the difference between high grade and low grade energies and II law Limitations on energy conversion.
3. To evaluate the concepts of entropy, availability and irreversibility.
4. To analyze the changes in properties of substances in various processes and to demonstrate the psychrometric properties and processes used in air conditioning.
5. To analyze the working of different gas and vapour power cycles.

UNIT-I

FUNDAMENTAL CONCEPTS: Fundamentals - System & Control volume; Property, State & Process; Exact & Inexact differentials; Work - Thermodynamic definition of work; examples; Displacement work; Path dependence of displacement work and illustrations Temperature, Definition of thermal equilibrium and Zeroth law; Temperature scales; Various Thermometers-Definition of heat; examples of heat/work interaction in systems. First Law for Cyclic & Non-cyclic processes; Concept of total energy, Internal energy and Enthalpy.

FIRST LAW OF THERMODYNAMICS:

First Law for Flow Processes - Derivation of general energy equation for a control volume; Steady state steady flow processes including throttling; Examples of steady flow devices; Unsteady processes; examples of steady and unsteady first law applications for system and control volume.

UNIT-II

SECOND LAW OF THERMODYNAMICS: Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale. Heat engine, Heat pump and Refrigerator.

UNIT-III

ENTROPY: Clausius inequality; Definition of entropy; Demonstration that entropy is a property; Evaluation of entropy for solids, liquids, ideal gases and

ideal gas mixtures undergoing various processes; Determination entropy from steam tables- Principle of increase of entropy; Illustration of processes in T-S coordinates.

AVAILABILITY AND IRREVERSIBILITY: Available energy referred to a cycle, decrease in available energy, and available energy from a finite source, maximum work in a reversible process, reversible work by an open system, dead state, availability, availability in a steady flow process and non flow process. Irreversibility and Gouy-Stodola theorem and its applications, second law efficiency.

UNIT-IV

PURE SUBSTANCE: Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations –Triple point at critical state properties during change of phase, Dryness Fraction. Mollier charts –Various Thermodynamic processes and energy transfer – Steam Calorimetry.

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

GAS POWER CYCLES : Otto, Diesel, Brayton, Dual Combustion cycles, Stirling 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.

VAPOUR POWER CYCLES: Basics of Carnot cycle, Rankine cycle and comparison of Carnot and Rankine cycle.

TEXT BOOKS :

1. Engineering Thermodynamics / PK Nag /TMH.
2. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.
3. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles TMH.

REFERENCE BOOKS :

1. Gupta C.P. & Prakash.R. Engineering Thermodynamics, Nem Chand & Brothers, Roorkee.
2. Mathur M.L and Mehta F.S, Thermal Engineering, Jain Brothers, New Delhi.
3. D S Kumar, Thermal science and Engineering, S K Kataria and sons, New Delhi.
4. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India.

5. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
6. Engineering Thermodynamics/ E Rathakrishnan/PHI.

COURSE OUTCOMES :

1. The graduates will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions along with will be able to evaluate the performance of energy conversion devices.
2. Ability to define the entropy, available energy and irreversibility.
3. The graduates will be able to differentiate between high grade and low grade energies.
4. Graduates can evaluate changes in thermodynamic properties of substances and able to demonstrate the psychrometric properties and processes used in air conditioning.
5. Comprehend the basic workings of gas and vapour power cycles.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J3306) MECHANICS OF SOLIDS

B.TECH. II YEAR – I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES: the Graduates will be able to learn

1. Basic concepts of stress, strain and their relations based on linear elasticity. Material behaviors due to different types of loading will be discussed.
2. Analyze how to calculate stresses and deformation of a bar due to an axial loading under uniform and non-uniform conditions.
3. How to develop shear-moment diagrams of a beam and find the maximum moment/shear and their locations.
4. Various problems in normal and shear stresses.
5. Concepts of Torsion of Circular Shafts and Thin Cylinders problems**.**

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, sudden, impact and shock loadings.

UNIT – II

Shear Force and Bending Moment : Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Flexural Stresses : Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

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

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 : T/J= q/r = Cθ/L – Assumptions made in the theory of pure torsion – Tensional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined ending and torsion and end thrust – Design of shafts according to theories of failure**.**

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in dia, and volume of thin cylinders– Thin spherical shells.

TEXT BOOKS :

1. Strength of materials – R.S. Kurmi and Gupta.
2. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
3. Strength of Materials – Ryder. G.H.; Macmillan Long Man Pub.
4. .Strength of Materials – W.A. Nash, TMH.

REFERENCE BOOKS :

1. Strength of Materials -By Jindal, Umesh Publications.
2. Analysis of structures by Vazirani and Ratwani.
3. Mechanics of Structures Vol –I by H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.
4. Strength of Materials by D.S Prakash Rao, Universities Press Pvt. Ltd.
5. Strength of Materials by S. S. Rattan, Tata McGraw Hill Education Pvt. Ltd.
6. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.

COURSE OUTCOMES :

1. Analyze the behavior of the solid bodies subjected to various types of loading;
2. Apply knowledge of materials and structural elements to the analysis of simple structures;
3. Undertake problem identification, formulation and solution using a range of analytical methods.
4. Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.
5. Expectation and capacity to undertake lifelong learning.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J3307) MATERIAL SCIENCE AND METALLURGY

B.TECH. II YEAR – I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To acquire knowledge on structure of metals and alloys.
2. To learn the concepts of equilibrium diagram and ferrous materials
3. To be able to apprehend the basic concepts of Steels and cast irons.
4. To analyze the concepts of mechanical working process and heat treatment.
5. To acquire the basic concepts on non-ferrous and composite materials.

UNIT – I

STRUCTURE OF METALS: Crystal structures-Body Centered Cubic, Face Centered Cubic, closed packed hexagonal, crystallographic planes. Mechanism of crystallization of metals, grain and grain boundaries, Effect of grain boundaries on the properties of metal / alloys – Determination of grain size.

CONSTITUTION OF ALLOYS: Necessity of alloying, Solid solutions-Interstitial Solid Solution and Substitution Solid Solution, Hume Rotherys rules.

UNIT - II

EQUILIBRIUM DIAGRAMS: Experimental methods of construction of equilibrium diagrams, Classification of equilibrium diagrams isomorphous, eutectic, partial eutectic equilibrium diagrams. Equilibrium cooling and heating of alloys, lever rule. Transformations in the solid state – allotropy, eutectic, eutectoid, peritectoid reactions .Study of Cu-Ni and Bi-Cd equilibrium diagrams.

FERROUS METALS AND ALLOYS: Study of Iron-Iron carbide equilibrium diagram.

UNIT - III

STEELS: Classification of steels, structure, properties and applications of plain carbon steels- low carbon steel, medium carbon steel and high carbon steel.

CAST IRONS: structure, properties and applications of white cast iron, malleable cast iron, gray cast iron, spheroidal graphite cast iron.

UNIT – IV

HEAT TREATMENT OF ALLOYS: Annealing, Normalizing and Hardening. Construction of TTT diagram for eutectoid steel. Hardenability-determination of hardenability by Jominy End quench test. Surface - hardening methods and age hardening treatment and application.

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

UNIT - V

COMPOSITE MATERIALS: Classification of composites, various methods of component manufacture of fiber reinforced composites-Hand layup process, Filament winding process, SMC processes, Continuous pultrusion processes, Resin transfer moulding. Introduction to Metal Ceramic Mixtures, Metal – Matrix composites and C – C composites and applications.

TEXT BOOKS :

1. Material Science and Metallurgy/kodgire.
2. V. Raghavan, Materials Science and Engineering, Prentice Hall of India, New Delhi
3. Sidney H. Avener, Introduction to Physical Metallurgy, Tata McGraw-Hill, 3rdEdition, 2011.

REFERENCE BOOKS :

1. Richard A.Flinn, Paul K.Trojan, Engineering Materials and Their Applications, Jaico Publishing House, 4thEdition, 1999.
2. William and callister, Materials Science and engineering, Wiley India private Ltd., 2011.
3. U.C Jindal and Atish Mozumber ,Material since and metallurgy.

COURSE OUTCOMES :

1. Estimate the properties of the material based on crystal structures.
2. Develop the equilibrium diagram for any binary system.
3. Determine the properties of steels based on Fe-Fe_3C equilibrium diagram.
4. Apply the principle of heat treatment to get desired properties in materials.
5. Distinguish between non ferrous metals and composite materials.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J3309) MECHANICS OF FLUIDS & HYDRAULIC MACHINERY

B.TECH. II YEAR – I SEM **L T P C**
3 1 0 4

COURSE OBJECTIVES :

1. Identify and obtain values of fluid properties and relationship between them.
2. Able to state the principles of continuity, momentum, and energy as applied to fluid motion, and to identify various types of flows.
3. Able to explain boundary layer concepts and flow through pipes.
4. Describe the operating characteristics of hydraulic machinery (pumps and turbines) and the factors affecting their operation and specifications, as well as their operation in a system.
5. To analyze the flow in water pumps and understand the functioning and characteristic curves of pumps.

UNIT-I

FLUID STATICS: Dimensions and units: physical properties of fluids- specific gravity, viscosity, surface tension- vapor pressure and their influence on fluid motion. atmospheric gauge and vacuum pressure–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 & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows- equation of continuity for one dimensional flow and three dimensional flow.

FLUID DYNAMICS: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT-III

BOUNDARY LAYER CONCEPTS: Definition, thickness, characteristics along thin plate, laminar and turbulent, boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

CLOSED CONDUIT FLOW: Reynolds's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line- hydraulic gradient line. Measurement of flow: pitot tube, venturi meter, and orifice meter, Flow nozzle, Turbine flow meter.

UNIT-IV

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, workdone and efficiency, flow over radial vanes. Hydraulic Turbines : Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design – draft tube theory- functions and efficiency. 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, work done – manometer head- losses and efficiencies specific speed- pumps in series and parallel- performance characteristic curves, NPSH.

RECIPROCATING PUMPS: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. V.L.Streeter, Fluid Mechanics, McGraw-Hill book Company, New York.
2. S.W.Yuan, Foundation of Fluid Mechanics, Prentice Hall of India, New Delhi.
3. Modi and Seth, Hydraulics and Fluid Mechanics, Standard Book House, New Delhi.
4. R.K. Rajput, “Fluid Mechanics & Hydraulic Machines”, S.Chand & Co.Ltd.,New Delhi.

REFERENCE BOOKS :

1. S.M.Yahya, Fundamentals of Compressible flow, Wiley Eastern Ltd.
2. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
3. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
4. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

COURSE OUTCOMES :

1. Ability to identify and obtain the values of fluid properties and relationship between them.
2. Ability to define the principles of continuity, momentum, and energy as applied to fluid motions.
3. Ability to recognize the basics of hydraulic machinery and their operation design in water distribution systems.
4. Ability to select and analyze an appropriate turbine with reference to given situation in power plants.
5. Graduates will be able to evaluate the performance of pumps.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J3308) MATERIAL TESTING AND METALLURGY LAB

B.TECH. II YEAR – I SEM **L T P C**

0 0 3 1.5

COURSE OBJECTIVES :

1. To determine the various mechanical properties of materials under different loading conditions.
2. To predict the behavior & properties of various materials by observing the microstructure.

List of Experiments :

(a) Material testing

Any six experiments may be conducted

1. Compression test on helical spring.
2. Tension test.
3. Double shear test.
4. Torsion test.
5. Impact test.

a) Izod test.
b) Charpy test.

6. Hardness test.

a) Rockwell Hardness test.
b) Brinell Hardness test.

7. Deflection test on beams.

a) Cantilever Beam.
b) Simply Supported beam.

8. Compression test on brittle materials.

(b) Metallurgy lab

Any six experiments may be conducted

1. Preparation and study of the microstructure of pure metals like Iron, Cu and Al.
2. Preparation and study of the microstructure of low carbon steels, medium carbon steel and high carbon steels.
3. Study of the microstructures of gray cast iron, malleable cast iron and nodular cast iron.
4. Study of the microstructures of brass.
5. Study of the microstructures of heat treated steels.
6. Hardenability of steels by Jominy end quench test.
7. Hardness of various treated and untreated steels.

COURSE OUTCOMES :

Analyze and design machine/structural members subjected to tension, compression, torsion by computing the allowable stresses.

1. To select material for a practical application.
2. Estimate the properties from the microstructure of materials.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J3310) MECHANICS OF FLUIDS & HYDRAULIC MACHINERY LAB

B.TECH. II YEAR – I SEM **L T P C**

0 0 3 1.5

Prerequisite Subject: Mechanics of Fluids & Hydraulic Machinery

COURSE OBJECTIVES :

1. To state the basic principles of fluid mechanics.
2. To identify various types of flows.
3. To define boundary layer concepts and flow through pipes.
4. To evaluate the performance of hydraulic turbines.
5. To gain knowledge on the functioning and characteristic curves of pumps.

LIST OF EXPERIMENTS :

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

COURSE OUTCOMES :

1. Ability to explain the effect of fluid properties on a flow system.
2. Ability to identify type of fluid flow patterns and describe continuity equation.
3. Ability to analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design.
4. Ability to select and analyze an appropriate turbine with reference to given situation in power plants.
5. Ability to estimate performance parameters of a given Centrifugal and Reciprocating pump.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(JMC01) ENVIRONMENTAL SCIENCE

B.TECH. II YEAR – I SEM **L T P C**

3 0 0 0

Objectives :

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations.

UNIT –I

Human Environment and Ecosystem: Introduction, Types of Environment (Natural Environment and its components). Man Made Environment, Social Environment, Concern about the environment, Potential hazards of carelessness in development activities (Bhopal tragedy, Chernobyl Accident).

Eco System: Definition, Types, structure, functional components of ecosystem, food chain and food web, flow of energy in an ecosystem, ecological pyramids, Bio magnification, Bio geochemical cycles (Gaseous and sedimentary cycles), ecosystem services and values.

UNIT –II

Natural Resources: Classification of resources, Living and Non living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT –III

Biodiversity and Biotic Resources: Introduction, genetic, species and ecosystem diversity, value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values, India as a mega diversity nation, Hot spots of biodiversity, threats to biodiversity; habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-situ and Ex-situ conservation.

UNIT –IV

Environmental Pollution and Control Technologies:

Environmental Pollution: Classification of Pollution

Air Pollution: Primary and Secondary pollutants, air pollution problems, Ambient Air Quality Standards.

Water Pollution: Source and types of pollution, problems due to water pollution, drinking water quality standards.
Soil Pollution: Source and types, Impacts of modern agriculture, degradation of soil.

Noise Pollution: Sources and health hazards, standards.
Solid Waste: Municipal solid waste management, composition and characteristics of E-waste and its management.

Pollution Control Technologies: Wastewater treatments methods: Primary, secondary, tertiary.

UNIT –V
Global Environmental Problems and Global Efforts: Climate change and impact on human environment. Ozone depletion and Ozone depleting substance (ODS). Acid rains, Deforestation and desertification.
International Conventions/Protocols: Earth Summit, Kyoto protocol and Montreal Protocol.

Text Books:

1. Text book of Environmental Studies for undergraduates courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R.Rajagopalan, Oxford University Press.

Reference:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and Science by Gilbert M. Masters and Wendell P. Ela 2008 PHI Learning Pvt.Ltd.
3. Environmental Science by Daniel B. Botkin and Edward A.Keller, Wiley India Edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New Age International Publishers.
5. Text Book of Environmental Science and Technology- Dr.M.Anji Reddy 2007 BS Publication.

Outcomes: After undergoing the course the student would be able to know about

1. Understanding of Ecosystem.
2. Natural resources, Depletion of natural resources and prevention methods
3. Biodiversity, Protection, sharing of the biodiversity.
4. Environmental pollution- Understanding of water, soil, noise and air pollution and their control measures.
5. Students can understand about global environmental problems and they are aware of global efforts.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J4E02)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

B.TECH. II YEAR – II SEM **L T P C**

3 0 0 3

Course Objectives :

1. To enable the student to understand and appreciate with financial insights.
2. To give importance for certain basic issues governing business operations.
3. To understand the relation between demand and supply of products and services.
4. To understand the relation of cost and output (production) of certain products and services.
5. To observe the markets and form of business organizations.
6. To describe the financial matters like capital budgeting, financial accounting & analysis of different kinds of business organizations.

UNIT I

Introduction & Demand Analysis.

Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT II

Production & Cost Analysis: Production Function-

lsoquants and lsocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT III

Markets & New Economic Environment:

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Objectives and Policies of Pricing. Methods of Pricing. Business; Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment Changing Business Environment in Post-liberalization scenario.

UNIT IV

Capital Budgeting:

Capital and its significance, Types of Capitat, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

UNIT V

Introduction to Financial Accounting & Financial Analysis:

Accounting concepts and conventions - Introduction IFRS - Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance sheet with simple adjustments). Financial, Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart'.

References :

1. Varshney & Maheswari: Managerial Economics, Sultan Chand' 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013'.
3. M' Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi. 2012.

Course outcomes :

The nature of economic activities like needs and wants of people in micro and macro environment.

1. The cost identification of product & services produced by organizations.
2. Market analysis of organizational products and services with different environments.
3. Determination of long term financial planning and the evaluation by using various methods.
4. Preparation of financial reports, analysis of business with different techniques of ration analysis, funds flow analysis, etc.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J4313) THERMAL ENGINEERING-I

B.TECH. II YEAR – II SEM **L T P C**

3 1 0 4

COURSE OBJECTIVES

1. To learn basic principles and operations of IC engines and SI engines.
2. To make the graduates familiar with the combustion and thermodynamic analysis of compression ignition engines along with testing and evaluating the performance of IC engines.
3. To explain some modern developments in IC Engines and the basic principles of operation of compressors.
4. To explain the different types of compressors.
5. To demonstrate the refrigeration cycles and their applications.

UNIT I

INTERNAL COMBUSTION ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition system and Cooling system.

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, Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

UNIT II

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.

TESTING AND PERFORMANCE OF ENGINES : 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 III

MODERN DEVELOPMENTS IN IC ENGINES:

Turbo charging and super charging of I.C.engines, Stratified charge engines (Lean burned SI engine) Multi fuel engines, Wankel engine.

COMPRESSORS– Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic type.

UNIT IV

ROTARY AND DYNAMIC COMPRESSORS: Roots Blower, vane sealed compressor, Lysholm compressor mechanical details and principle of working – efficiency considerations. 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.

UNIT V

REFRIGERATION : Mechanical Refrigeration and types – units of refrigeration – Air Refrigeration system, details and principle of operation – applications of air refrigeration, Vapour compression refrigeration systems – calculation of COP – effect of superheating and sub cooling, desired properties of refrigerants and common refrigerants- Vapour absorption system – mechanical details – working principle, Use of p-h charts for calculations.

AIR-CONDITIONING: Concepts of Psychrometry – Properties of moist air – Usage of Psychrometric Chart – Calculation of moist air properties. Types of air – conditioning systems – Requirements – schematic layout of a typical plant.

TEXT BOOKS :

1. I.C. Engines / V. Ganesan- TMH.
2. Thermal Engineering / Rajput / Lakshmi Publications.
3. Thermal Engineering / P.K.Nag.

REFERENCE BOOKS :

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of IC Engines – Pulkrabek / Pearson /PHI.
3. Thermal Engineering / Rudramoorthy - TMH.
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad.
5. I.C. Engines / Heywood /McGrawHIll.
6. Thermal Engineering – R.S. Khurmi & J.K.Gupta – S.Chand.

COURSE OUTCOMES :

1. Ability to gain knowledge on the importance behind the IC engines.
2. Ability to know the working of the basic components in the IC engines and Compressors.
3. Ability to explain the combustion process and also how it does affect the performance of the IC engines.
4. Ability to Apply the thermodynamic principles in the design of an IC engines and compressors.
5. Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J4314) KINEMATICS OF MACHINERY

B.TECH. II YEAR – II SEM **L T P C**

3 1 0 4

COURSE OBJECTIVES :

1. To define the concepts of mechanisms and need in machines/systems.
2. To interpret kinematic analysis on mechanisms (reciprocating & rotary).
3. To state the concepts of instantaneous centre and velocity and accelerations of the links of mechanism.
4. To learn the various steering gears used in automobiles and power transmitting capacity of belt drives.
5. To define the cam design and kinematics of gears and gear trains.

UNIT-I

Mechanisms: Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematics pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully and incompletely constrained .

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

UNIT—II

Velocity Analysis: Relative Velocity Method, Instantaneous center Method, the Aronhold- Kennedy Theorem of Three centers, Velocity Diagrams.

Acceleration Analysis: Radial and Transverse Components of Acceleration, The Coriolis Component of Acceleration, Acceleration Diagrams, and Klein's construction.

UNIT—III

Straight-line motion mechanisms: Exact and approximate copied and generated types – Peaucellier - Hart - Scott Russel – Grasshopper – Watt - Tchebicheff's and Robert Mechanism - Pantographs.

Steering gears: Conditions for correct steering – Davis Steering gear, Ackerman's steering gear.

Hooke's Joint: Single and double Hooke's joint –velocity ratio – application – problems.

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 and retardation. Maximum velocity and maximum acceleration during Outward and return strokes in the above 3 cases.

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

UNIT –V

Higher pair: Friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion – velocity of sliding Forms of teeth, cycloidal and involutes profiles – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference – expressions for arc of contact and path of contact of Pinion & Gear and Pinion & Rack Arrangements– Introduction to Helical – Bevel and worm gearing.

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

TEXT BOOKS :

1. Rattan S.S, “Theory of Machines”, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi,2011.
2. Shigley J.E. and Uicker J.J., “Theory of Machines and Mechanisms”, 2ndEdition, McGraw-Hill, Inc.,1995.

REFERENCE BOOKS :

1. Thomas Bevan, “Theory of Machines”, 3rd edition, 3rd impress, CBS Publishers and Distributors, 2013.
2. Rao J.S and Dukkipati R.V, “Mechanism and Machine Theory”, 2ndEdition, New Age International, New Delhi, 2007.
3. Sadhu Singh “Theory of Machines”, 3rd edition, Pearson Education, 1997.
4. Ballaney.P.L “Theory of Machines”, 20th edition, Khanna Publishers,1996.
5. Ambekar A. G.,” Mechanism and Machine Theory”, 2nd reprint, Prentice Hall of India, New Delhi, 2009.

COURSE OUTCOMES :

1. Ability to analyze the kinematics of linkages to determine position, velocity and acceleration variation throughout the range of motion.
2. Ability to develop the ability to come up with innovative ideas regarding mechanisms/machines.
3. Ability to determine the velocity & accelerations of various links of any mechanism.
4. Ability to design cams or gear trains to produce a desired motion.
5. Ability to estimate the gear ratio and analyze the differential gear box of an automobile.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J4315) MANUFACTURING PROCESSES

B.TECH. II YEAR – II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To describe the basics of metal casting processes and their applications.
2. To learn the types of welding and their applications.
3. To illustrate rolling processes their applications.
4. To infers the principles and operation of metal forming and sheet metal and drawing operations.
5. To learn the Principles of forging and extrusion process their applications.

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.

UNIT-II

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die 3) Investment.

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

UNIT-III

A) 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.

B) Cutting of Metals: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals. Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & 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. 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 Hydrostatic extrusion.

FORGING PROCESSES: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects.

TEXT BOOKS :

1. P.N.Rao, Manufacturing Technology, 2/e, Tata McGraw-Hill, New Delhi, 1990.
2. Amitabha Ghosh and Ashok Kumar Mallik, Manufacturing Science, 4/e, Associated East West Press Pvt. Ltd., New Delhi, 1991.

REFERENCE BOOKS :

1. George E Dieter, Mechanical Metallurgy, McGraw-Hill, New York.
2. Roy, A. Lindberg, Processes and Materials of Manufacture, 5/e, Prentice Hall of India, New Delhi.
3. O P Khanna, Welding Technology, Dhanapat Rai Publications (P) Ltd., New Delhi.
4. R S Parmar, Welding Technology, Khanna Publishers, New Delhi.

COURSE OUTCOMES:

1. Ability to analyze different casting processes by their applications.
2. Ability to describe various methods of welding with their applications.
3. Ability to determine material deformation energy in plane rolling.
4. Ability to explain fundamentals and process of various metal forming and sheet metal operations.
5. Ability to analyze principles and operation of various metal forging and extrusion operations and applications.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J4316) MANUFACTURING PROCESSES LAB

B.TECH. II YEAR – II SEM **L T P C**

0 0 3 1.5

COURSE OBJECTIVES :

1. To provide hands-on laboratory experience in the area of production.
2. To provide basic knowledge about casting and tools used in casting.
3. To familiarize with welding equipment and various welding processes.
4. To acquire practical knowledge in mechanical press working.

Minimum of 12 Exercises need to be performed.

I. METAL CASTING

1. Pattern Design and making for one casting drawing.
2. Sand properties testing -Exercise-for strengths, and permeability –1 exercise.
3. Moulding Melting and Casting -1 Exercise.

II. WELDING

1. ARC Welding Lap & Butt Joint -2- Exercises.
2. Spot Welding -1 Exercise.
3. TIG Welding -1 Exercise.
4. Plasma welding and Brazing –2 Exercises (Water Plasma Device).

III. MECHANICAL PRESS WORKING

1. Blanking & Piercing operation and study of simple, compound and progressive press Tool.
2. Hydraulic Press : Deep drawing and extrusion operation.
3. Bending and other operations.

IV. PROCESSING OF PLASTICS

1. Injection Moulding.
2. Blow Moulding.

COURSE OUTCOMES:

1. Ability to apply the principles of production technology in manufacturing industries.
2. Ability to evaluate the quality of welded joints.
3. Ability to express the basic idea of press working tools
4. Ability to recognize different moulding methods on plastics.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J4317) MACHINE DRAWING PRACTICE

B.TECH. II YEAR – II SEM **L T P C**

0 0 3 1.5

Prerequisite Subject: Engineering Graphics

COURSE OBJECTIVES :

1. Able to learn basic conventions adopted in machine drawing.
2. Able to familiarize the machine elements such as screw fasteners, couplings & bearings used in design.
3. Able to learn the mechanical components like cotter and knuckle joints used in design.
4. Able to comprehend the assembly drawings for engine parts, valves.
5. Able to predict the machine parts like bench vice, pipe vice, plummer block etc.

I. MACHINE DRAWING CONVENTIONS

Need for drawing conventions – introduction to IS conventions

A) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs and ribs.

B) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.

C) Title boxes, their size, location and details - common abbreviations & their liberal usage.

D) Types of Drawings – working drawings for machine parts.

II. DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS

1. Selection of views, additional views for the following machine elements and parts with every drawing proportion.

A) Popular forms of screw threads, bolts, nuts, stud bolts, tap bolts and set screws.

B) Keys, cotter joints and knuckle joint.

C) Riveted joints for plates.

D) Shaft coupling, spigot and socket pipe joint.

E) Journal, pivot and collar and foot step bearings.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(JMC02) GENDER SENSITIZATION

B.TECH. II YEAR – II SEM **L T P C**

2 0 0 0

Objectives :

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

UNIT – I

Understanding Gender: Gender: Why Should We Study It? (Towards a World of Equals: Unit -1) Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT – II

Gender and Biology Missing Women: Sex Selection and Its Consequences (Towards a World of Equals: Unit-4) Declining Sex Ratio. Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.

UNIT – III

Gender and Labour Housework: The Invisible Labour (Towards a World of Equals: Unit -3) "My Mother doesn't Work." "Share the Load." Women's Work: Its Politics and Economics (Towards a World of Equals: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT – IV

Issues of Violence Sexual Harassment: Say No! (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding lives. Additional Reading: New Forums for Justice.

Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim-"I Fought for my Life.." – Additional Reading: The Caste Face of Violence.

UNIT – V

Gender : Co – Existence Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

Text Book :

All the five Units in the Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

Reference :

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012.
2. Abdulali Sohaila. "I Fought For My Life...and Won".

Outcomes :

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5E01) MANAGEMENT SCIENCE

B.TECH. III YEAR – I SEM **L T P C**
3 0 0 3

Course Objectives :

1. This course is intended to familiarize the students with the framework for the managers and leaders available for understanding and making decision related to organization.
2. Formation of Organizational structures.
3. Industrial management shows how to do things better in every sphere of activity including industry and academics.
4. It helps in understanding and making decisions relating to issues regarding organizational structure , production operations, marketing.
5. It is a growing business field that can lead to a variety of career paths.

UNIT - I:

Introduction to Management and Organisation: Concepts of Management and organization-nature, importance and Functions of Management, Systems Approach to Management - Taylor's Scientific Management Theory- Fayal's Principles of Management- Maslow's theory of Hierarchy of Human Needs- Douglas McGregor's Theory X and Theory Y - Hertzberg Two Factor Theory of Motivation - Leadership Styles, Social responsibilities of Management, Designing Organisational Structures: Basic concepts related to Organisation - Departmentation and Decentralisation, Types and Evaluation of mechanistic and organic structures of organisation and suitability.

UNIT - II :

Operations and Marketing Management: Principles and Types of Plant Layout-Methods of Production(Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement - Business Process Reengineering(BPR) - Statistical Quality Control: control charts for Variables and Attributes (simple Problems) and Acceptance Sampling, TQM, Six Sigma, Deming's contribution to quality, Objectives of Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Store Records - JIT System, Supply Chain Management, Functions of Marketing, Marketing Mix, and Marketing Strategies based on Prodcut Life Cycle, Channels of distribution.

UNIT - III:

Human Resources Management(HRM):

Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Seperation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating - Capability Maturity Model (CMM) Levels – Performance Management System.

UNIT - IV:

Project Management (PERT/ CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

UNIT - V:

Strategic Management and Contemporary Strategic Issues: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balanced Score Card as Contemporary Business Strategies.

TEXT BOOKS :

1. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.
2. P. Vijay Kumar, N. Appa Rao and Ashnab, Chnalill, Cengage Learning India, 2012.

REFERENCE BOOKS :

1. Kotler Philip and Keller Kevin Lane: Marketing Management, Pearson, 2012.
2. Koontz and Weihrich: Essentials of Management, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich Management - Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford Uiversity Press, 2012.
5. Samuel C. Certo: Modern Management, 2012.
6. Schermerhorn, Capling, Poole and Wiesner: Management, Wiley, 2012.
7. Parnell: Strategic Management, Cengage, 2012.
8. Lawrence R Jauch, R. Gupta and William F. Glueck: Business Policy and Strategic Management Science, McGraw Hill, 2012.

Course outcomes:

1. Strong emphasis on the practical skills essential to successful management careers.
2. Identify the theories and practices of the business ethics and social responsibilities.
3. The learning outcomes are used in evaluating students decision making in building up there career.
4. Apply management science to case studies in finding solutions.
5. It guides then in establishing themselves as effective professionals by solving real problems.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5318) DYNAMICS OF MACHINERY

B.TECH. III YEAR – I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To explain the effect of frictional force on clutches and brakes under various conditions.
2. To compose the knowledge of kinematic synthesis and dynamics of different applications of gyroscopic and precession motion.
3. To generates the knowledge on the concept of energy stored in the fly wheels and speed regulations of various governors.
4. To infers the concepts of static and dynamic mass balancing of rotating and reciprocating masses to minimize vibrations and noise.
5. To Comprehend the concepts of free and damped vibrations.

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.

Clutches: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch and centrifugal clutch.

UNIT –II

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 fly wheels: Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

Governors: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxiliary springs. Sensitiveness, isochronisms and hunting.

UNIT – IV

Balancing: Balancing of rotating masses Single and multiple – single and different planes.

Balancing of reciprocating masses: Primary, Secondary and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces

and couples examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive efforts.

UNIT – V

Vibration: Free Vibration of mass attached to vertical spring – oscillation of pendulums, centers of oscillation and suspension. Transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method. Whirling of shafts, critical speeds and torsional vibrations, two and three rotor systems. Simple problems on forced damped vibration Vibration Isolation & Transmissibility.

TEXT BOOK :

1. Rattan S.S, "Theory of Machines", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.
2. Shigley J.E. and Uicker J.J., "Theory of Machines and Mechanisms", McGraw-Hill, Inc., 1995.

REFERENCE BOOKS :

1. Rao J.S and Dukkipati R.V, "Mechanism and Machine Theory", New Age International, NewDelhi, 2007.
2. Thomas Bevan, "Theory of Machines", CBS Publishers and Distributors, 1984.
3. Sadhu Singh "Theory of Machines", Pearson Education, 2002.
4. Ballaney.P.L "Theory of Machines", Khanna Publishers,1990.
5. Ghosh A. and Mallick A.K., "Theory of Mechanisms and Machines", Affiliated East- West Press Pvt. Ltd., New Delhi, 1988.

COURSE OUTCOMES :

1. Ability to solve the practical problems on clutches and brakes under various conditions.
2. Ability to recognize the needs of various principles of dynamics and application of brakes and dynamometers.
3. Ability to analyze the energy storage in the flywheels and speed regulations of various Governors.
4. Ability to balance the unbalanced forces developed in the rotating and reciprocating masses.
5. Ability to analyze the concepts of vibrations & take measures to minimize vibration and noise.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5319) THERMAL ENGINEERING-II

B.TECH. III YEAR – I SEM **L T P C**

3 1 0 4

Prerequisite: Thermodynamics, Thermal Engineering-1

COURSE OBJECTIVES :

1. To explain about main features of Rankine cycle and its performance improvement along with boilers, boiler accessories.
2. To describe about and performance of a steam nozzles.
3. To infers the salient features of impulse, reaction turbines.
4. To learn about different types of steam condensers and gas turbines.
5. To learn about classification and working of jet propulsion and rocket engines.

UNIT – I

Basic Concepts: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating. Combustion: fuels and combustion, concepts of heat of reaction, adiabatic flame temperature.

Boilers: Classification – working principles – with sketches including H.P.Boilers – Mountings and Accessories – working principles, boiler performance – draught.

UNIT II

Steam Nozzles : Function of nozzle – applications - types, 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, its 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. Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

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.

UNIT – IV

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

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.

UNIT – V-

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, 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.
2. Gas Turbines – V.Ganesan /TMH.

REFERENCE BOOKS :

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot.
2. Gas Turbines and Propulsive Systems – P.Khajuria&S.P.Dubey - / Dhanpatrai.
3. Thermal engineering-Ajoy kumar,narosa publications.
4. Gas Turbines / Cohen, Rogers and SaravanaMuttoo / Addison Wesley – Longman.
5. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.
6. Thermal Engineering-P.L.Bellaney/ khanna publishers.
7. Thermal Engineering-M.L.Marthur& Mehta/Jain bros.

COURSE OUTCOMES :

1. Ability to analyze the different steam power plants and working of boilers.
2. Ability to demonstrate the working of steam nozzles.
3. Capability to analyze the working of different steam turbines.
4. Ability to interpret about stem condenser and gas turbine components.
5. Illustrate the working of jet propulsion and rocket engines.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5321) MANUFACTURING TECHNOLOGY

B.TECH. III YEAR – I SEM **L T P C**

4 0 0 4

COURSE OUTCOMES :

1. To describe the fundamentals of metal cutting and cutting tool geometry.
2. To define the working of lathe, shaper, planer, drilling, milling and grinding machines.
3. To explain the speed and feed mechanisms of machine tools.
4 To estimate machining times for machining operations on machine tools
5. To explain the concepts of finishing operations like grinding, lapping, honing and broaching.

UNIT -I

Elementary treatment of metal cutting theory – Element of cutting process - Geometry of single point cutting tool and angles, chip formation and types of chips, chip breakers. Mechanics of orthogonal cutting-Merchant's force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability – Tool materials.

UNIT – II

Engine lathe – Principle of working, specification of lathe – types of lathe – Taper turning, thread turning – Lathes and attachments. Turret and capstan lathes – work holding, tool holding devices –tool layout.

UNIT – III

Shaper, Slotting and Planning Machine: Types, principal parts, mechanism, operations and machining time calculations.

Drilling Machine: Types, principal parts, Nomenclature of a drill, spindle drive and feed mechanisms, work and tool holding devices, drilling operations.

Boring Machine: principal parts, Types and operations.

UNIT – IV

Milling machine: Types, Up Milling Vs Down Milling, Types of milling cutters, Operations, Dividing head, Machining time estimation.

UNIT –V

Grinding machines: Types –specification of a grinding wheel and selection of a grinding wheel, Truing, Dressing, and Classification of Grinding wheels, types of abrasives.

Surface Finishing Processes: Lapping, Honing and Super-finishing processes.

TEXT BOOKS :

1. Hajra Chowdary, S.K., Bose. S. K and Hajra Chowdary, A.K., ¯Elements of Workshop Technology , Vol. II, 5th edn., Asia Publishing House, Bombay, 1982.
2. A text book of manufacturing technology –II by P C Sharma, S .chand,2010.
3. Manufacturing Technology, Volume II By P.N.Rao, TMH,2009.

REFERENCE BOOKS :

1. Kalpakjian, S. and Steven R. Schmid, Manufacturing, Engineering & Technology, 3rd edn., Pearso, 1995.
2. Principles of Machine Tools, Bhattacharyya A and Sen.G.C / New Central Book Agency.

COURSE OUTCOMES :

1. Ability to define and explain nomenclature of single point cutting tool in various systems and select.
2. Ability to classify various types of machine tools and their operations.
3. Ability to comprehend the features, operations and applications of various machine tools like lathe, drilling, milling, shaper and grinding.
4. Ability to describe various mechanisms of feed and speed changing in lathe, quick return in slotting quill in drilling, indexing in milling.
5. Ability to summarize features, operations and applications of various surface finishing process.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5333) FINITE ELEMENT METHOD

B.TECH. III YEAR –I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To apply vector mechanics as a tool for problem solving.
2. To define the need in Design for the Finite Element Method.
3. To learn mechanical engineering design concepts to use the Finite Element Method software correctly and efficiently.
4. To analyze a physical problem; develop experimental procedures for accurately investigating the problem, and effectively perform and document findings.
5. To explain the forces associated with different parts of a machine.

UNIT-I

Introduction to FEM: Basic Concepts, historical background, application of FEM, General description, comparison of FEM with 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-properties of stiffness matrix. 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.

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-Elements stiffness matrix – Load vector-Problems.

UNIT-IV

Problems: CST element –Stiffness matrix and load vector- Isoparametric element representation-Shape functions- Convergence requirements-Problems Two dimensional four noded isoparametric elements – numerical integration – finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements- 3-D problems. Tetrahedran elements.

UNIT-V

Scalar field problems: 1-D Heat conduction – 1D Finite elements- Composite slabs – 2D Heat conduction- analysis of thin plates-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. Introduction of Finite Element Analysis – S.Md.Jalaludeen - Anuradha Publications.
2. Introduction to Finite Elements in Engineering –Tirupathi K. Chandragupta and Ashok D.Belagundu.

REFERENCE BOOKS :

1. The Finite Element Methods in Engineering –SS Rao-Elsevier-4th Edition.
2. An introduction to Finite Element Method – JN Reddy- Mc Graw Hill.
3. The Finite Element Method in engineering science –O.C. Zienkowitz, Mc. Graw Hill.
4. Finite Element Methods/ Alavala/TMH.
5. Concepts and application of finite element analysis-Robert Cook –Wiley.

COURSE OUTCOMES :

1. Ability to summarize the numerical methods involved in Finite Element Theory and the role and significance of shape functions in finite element formulations and use linear, quadratic, and cubic shape functions for interpolation.
2. Ability to familiarize direct and formal (basic energy and weighted residual) methods for deriving finite element equations.
3. Ability to formulate one-dimensional elements (truss and beam).
4. Ability to formulate two-dimensional elements (triangle and quadrilateral continuum and shell elements).
5. Ability to formulate three-dimensional elements.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5334) ROBOTICS

B.TECH. III YEAR –I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To describe the basics of robots and various types of gripper.
2. To explain the rotation matrices and D-H representation.
3. To infers the fundamentals of robot dynamics.
4. To differentiate the Path and the trajectory planning of robots.
5. To illustrate the various sensors used in robots and industrial applications of robots.

UNIT - I

INTRODUCTION : Basic concepts – Robot anatomy –Components of robots- Robot motions – Number of D.O.F – Work volume – Robot drive systems – Classification of robots by control method – Specifications of robots.

END EFFECTORS: Introduction – Types of end effectors – Mechanical grippers – Vacuum cups, magnetic grippers, adhesive gripers and others – Robot / End effectors interface – Considerations in gripper selection and design.

UNIT - II

MANIPULATOR KINEMATICS: Introduction –Coordinate Frames, Description of Objects in space, Transformation of vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices, Problems- D-H representation – problems on forward kinematics.

UNIT - III

DYNAMICS: Introduction -Differential transformations- jacobian – problems–, Lagrange Euler formulation , Problems.

UNIT - IV

TRAJECTORY PLANNING: Introduction – considerations on trajectory planning – joint Interpolated trajectory – Cartesian path trajectory – problems.

ROBOT PROGRAMMING :- Methods of robot programming – Lead through method.- Textual robot languages – Generations of programming languages – Robot language structure – Motion commands – End effector and sensor commands – VAL II programming language.

UNIT - V

ACTUATORS: Pneumatic, Hydraulic actuators, Servo motors, Stepper motors.

SENSORS: Position sensors: Potentiometers, resolvers, encoders – velocity sensors.

ROBOT APPLICATION IN MANUFACTURING: Material transfer and machine loading/ unloading applications – Processing operations – Assembly and inspection – Future applications.

TEXT BOOKS :

1. MikellP.Groover, Mitchell Weiss, Roger N. Nagel&Nicholas G. Odrey; Industrial Robotics, McGraw- HILL International Editions,1986.
2. R.K.Mittal and IJ Nagrath, Robotics and Control ,Tata McGraw – Hill publishing company Limited, New Delhi,2003.

REFERENCE BOOKS :

1. Robert J.Schilling, Fundamentals of robotics analysis & control, PHI learning private limited, New Delhi,4thEdition 2002.
2. SaeedB.Niku, Introduction to robotics analysis systems Application, PHI learning private limited, New Delhi,2002.
3. K.S.Fu, R.C Gonzalez and C.S.G.Lee, Robotics control, Sensing, vision, and intelligence; McGraw HILL International Editions,3rdEdition 2008.

COURSE OUTCOMES :

1. Ability to apply robot fundamentals in designing various types of end effectors.
2. Ability to design the end effectors required for different applications.
3. Ability to formulate D-H matrices for forward kinematics problems & Develop dynamic equations for robot dynamic problems.
4. Ability to determine the robot trajectory to robotic motion & Basics of Robot Language.
5. Ability to select the sensors depending upon robotic application & its uses in various areas.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5335) PRODUCTION PLANNING AND CONTROL

B.TECH. III YEAR –I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To explain about the problems and opportunities faced by the operations manager in Manufacturing and service organizations.
2. To develop an ability to apply Production planning control concepts in a various areas like marketing, accounting, finance, engineering, personnel management, logistics, etc.
3. To integrate operations concepts with other functional areas of business.
4. To differentiate the Production planning and control function in both manufacturing and service organizations.
5. To examine several classic Operations Management planning topics including Production planning and inventory control.

UNIT – I

Introduction : Definition – 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 department – Internal organization of department.

UNIT – II

Forecasting – Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods.

UNIT – III

Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P– Systems and Q-Systems – Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

UNIT –IV

Routing – Definition – Routing procedure –Route sheets – Bill of material – Factors affecting routing Procedure. Schedule –definition – Difference with loading, Scheduling Policies – Techniques, Standard scheduling methods, Line Balancing, Aggregate planning, Chase planning, Expediting, controlling aspects.

UNIT –V

Dispatching – Activities of dispatcher – Dispatching procedure – follow up – definition – Reason for existence of functions – types of follow up, applications of computer in production planning and control.

TEXT BOOKS :

1. Elements of Production Planning and Control / Samuel Eilon.
2. Modern Production/ operation managements / Baffa & Rakesh Sarin.

REFERENCE BOOKS :

1. Operations Management – S.N. Chary.
2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
3. Reliability Engineering & Quality Engineering by Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Galgotia Publications, Pvt., Limited.
4. Production Control A Quantitative Approach / John E. Biegel.
5. Production Control / Moore.
6. Operations Management / Joseph Monks.

COURSE OUTCOMES :

1. Ability to recognize the objectives, functions, applications of PPC and forecasting techniques.
2. Ability to explain different Inventory control techniques.
3. Ability to solve routing and scheduling problems
4. Ability to summarize various aggregate production planning techniques.
5. Ability to describe way of integrating different departments to execute PPC functions.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5320) THERMAL ENGINEERING LAB

B.TECH. III YEAR – I SEM **L T P C**

0 0 3 1.5

COURSE OBJECTIVES :

1. To learn the construction and working principle of I.C. Engines practically.
2. To explain the working principle and performance of air compressor practically.
3. To learn the heat balance test of an I.C. Engine.
4. To acquire the priorities given to the efficient use of energy and the minimization of Environmental pollution.
5. To explain the usage of data acquisition systems.

LIST OF EXPERIMENTS :

At least 10 Experiments are required to be conducted

1. I.C. Engines Valve & Port Timing Diagrams.
2. Performance Test on single cylinder 4 -Stroke Diesel Engine by using Mechanical Dynamometer.
3. Performance Test on Reciprocating Air – Compressor.
4. Evaluation of Engine friction by conducting Motoring/Retardation test on 4-stroke Diesel Engine.
5. Study of boilers.
6. I.C. Engine Heat Balance sheet.
7. Performance Test on single cylinder 2-Stroke Petrol Engine.
8. Performance test on Multi cylinder 4-stroke petrol engine by using Hydraulic Dynamometer.
9. Performance Test on Variable Compression Ratio single cylinder 4-Stroke Diesel Engine By using Eddy Current Dynamometer.
10. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine.
11. Determine of economical speed test for fixed load on 4-stroke engine.
12. Assembly / Disassembly of Engines.

COURSE OUTCOMES :

1. Ability to find the efficiency and performance of an engine system for a given set of conditions.
2. Ability to calculate the Volumetric efficiency of air compressor.
3. Ability to develop skills in data acquisition systems.
4. Ability to evaluate the engine performance and explore the ways to improve the efficiency of engines.
5. Ability to realize the need to minimize the losses in engines.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J5322) MANUFACTURING TECHNOLOGY LAB

B.TECH. III YEAR – I SEM **L T P C**

0 0 3 1.5

COURSE OBJECTIVES :

1. To learn the various machining processes.
2. To familiarize with the tools used in machine shop.
3. To define basic operations of lathe, milling, drilling, shaping and planning machines etc.

LIST OF EXPERIMENTS :(Any 12 experiments may be conducted).

1. Machining operations on Lathe. (Three Exercises).
2. Machining operations on Radial drilling machine. (Two Exercises).
3. Machining operations on Shaping Machine. (One Exercise).
4. Machining operations on Planning Machine. (One Exercise).
5. Machining operations on Slotting Machine. (One Exercise).
6. Machining operations on Milling Machine. (Two Exercises).
7. Machining operations on Cylindrical Grinding Machine. (One Exercise).
8. Machining operations on Surface grinding Machine. (One Exercise).
9. Tool and cutter grinder Machine. (One Exercise).

COURSE OUTCOMES :

1. Ability to exhibit the developing sequence of machining operations required for in industry.
2. Capability of manufacturing components according to given working drawings.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(JMC03) CONSTITUTION OF INDIA

B.TECH. III YEAR – I SEM **L T P C**
2 0 0 0

Objectives :

1. The Constitution is the basic and fundamental law.
2. To introduce concepts and salient features of the constitution Indian.
3. Analyze the Preamble of the Constitution and identify the core values reflected in it.
4. Appreciate the core constitutional values that permeate the salient features of the.
5. Indian Constitution; and examine the nature of the Indian federal system and the parliamentary form of govern.

UNIT - I

Introduction to Constitution' meaning of the term,, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT - II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha.

UNIT - III

State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

UNIT - IV

Local Administration District's Administration head: Role and Importance, Municipalities:Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayatiraj: Introduction, PRI: Zila parishadh, Elected officials and their roles, CEO Zila parishadh: Position and role, Block level: Organizational Hierarchy (Different departments) village level: Role of Elected and Appointed officials,Importance of grass root democracy,

UNIT - V

Election Commission Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ ST/OBC and women.

References:

1. Books. Recommended.
2. Indian Polity' by Laxmikanth.
3. Indian Administration' by Subhash Kashyap.
4. 'Indian Constitution' by D.D. Basu.
5. 'Indian Administration' by Avasti and Avasti.

Outcomes :

1. It also tells us about the rights and also the duties of its citizens.
2. They know about the role, powers of members of local sabha and raj sabha.
3. It lays down the rules to govern the country.
4. Role and function of election commissioner.
5. Power and duties of elected represented s for panchayatraj , ZP, corporation and Importance of democracy.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6323) DESIGN OF MACHINE ELEMENTS

B.TECH. III YEAR –II SEM **L T P C**

3 0 0 3

Pre requisites: Mechanics, Strength of materials.

COURSE OBJECTIVES :

1. To define concepts of various types of stress concentration factors and application of failure theory geometries and the concepts regarding riveted, welded, bolted joints and eccentric loading.
2. To learn the concepts of stresses in various joints like keys, cotters and knuckle.
3. To familiarize the concepts of Shaft couplings and Shaft coupling.
4. To infers the concepts regarding design of bearings, shafts and different engine parts.
5. To acquire the concepts related to design and analysis of spur and helical gears.

UNIT – I

Strength of machine elements : Stress concentration – Theoretical stress Concentration factor – Fatigue stress concentration factor notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Goodman's line – Soderberg's line – Modified Goodman's line. Riveted and welded joints – Design of joints with initial stresses – eccentric loading. Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – locking devices – both of uniform strength, different seals.

UNIT - II

Keys, Cotters and Knuckle joints: Design of Keys-stresses in keys-cottered joints- spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. Use of internal and external circlips, Gaskets and seals (stationary & rotary).

UNIT – III

Shaft coupling: Rigid couplings –Muff, Split muff and Flange couplings. Flexible couplings – Flange coupling (Modified).

Mechanical Springs : Stresses and deflections of helical springs – Extension -compression springs – Springs for fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs – Co-axial springs, leaf springs.

UNIT – IV

Bearings : Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings –Clearance ratio – Heat dissipation of bearings, bearing materials –journal bearing design – Ball and roller bearings – Static loading of ball & roller bearings, Bearing life.

Engine parts: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – Cranks and Crank shafts, strength and proportions of over hung and center cranks – Crank pins, Crank shafts. Pistons Forces acting on piston.Construction Design and proportions of piston. Cylinder, Cylinder liners.

UNIT – V

Spur & Helical gear drives: Spur gears- Helical 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, check for plastic deformation. Check for dynamic and wear considerations.

TEXT BOOKS :

1. Machine Design, V.Bandari Tmh Publishers.
2. Machine Design, S MD Jalaludin, AnuRadha Publishers.
3. Design Data hand Book, S MD Jalaludin, AnuRadha Publishers.

REFERENCE BOOKS :

1. Design of Machine Elements / V.M. Faires.
2. Machine design / Schaum Series.
3. Machine design – Pandya & shah.

COURSE OUTCOMES :

1. Graduates will be able to apply the concepts of various types of stress concentration factors and application of failure theory geometries.
2. Ability to design riveted, welded, bolted joints for eccentric loading.
3. Capability to design keys, cotters and knuckle joints using the concepts of stresses.
4. Ability to design bearings, shafts and different engine parts.
5. Ability to design and analyze spur and helical gears.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6324) HEAT TRANSFER

B.TECH. III YEAR –II SEM **L T P C**

3 1 0 4

Prerequisites: Thermodynamics, Thermal Engineering

COURSE OBJECTIVES :

1. To learn the basic differential equations of heat transfer in conduction, convection and radiation.
2. To analyze the concept of one dimensional steady state and unsteady state heat conduction.
3. To explain the mechanisms and correlations of Forced Convection.
4. To illustrates the LMTD and NTU concepts in heat exchangers.
5. To explain the mechanism of radiation heat transfer and phase change processes of boiling and condensation.

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.

One Dimensional Steady State Conduction Heat Transfer: Homogeneous slabs, hollow cylinders and spheres- Composite systems– overall heat transfer coefficient – Electrical analogy – Critical radius of insulation.

UNIT-II

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 – Infinite bodies- Chart solutions of transient conduction systems- Concept of Semi infinite body.

UNIT-III

Convective heat transfer: Classifications of fluid flows. Dimensional analysis as a tool for experimental investigation – Buckingham's ð-theorem and method - Significance of non-dimensional numbers.

Forced convection: External flows: concepts about hydrodynamic and thermal boundary layer- use of empirical correlations for convective heat transfer - flow over a flat plate, horizontal plate, over a cylinder.

Internal flows – concepts about hydrodynamic and thermal boundary layer and 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 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

Heat Transfer with Phase Change:

Boiling and Condensation: – Pool boiling – Regimes – Calculations on Nucleate boiling, Critical Heat flux and Film boiling

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.

Radiation Heat Transfer : Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchoff, 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 BOOK :

1. Fundamentals of Engineering, Heat & Man Transfer-R.C.Sachdeva/ NewAge.
2. Fundamentals of Heat Transfer –Incropera& Dewitt/John wiley.
3. Heat& Man Transfer-D.S.Kumar/S.K.Kataria& sons.

REFERENCE BOOKS :

1. Heat Transfer – A Practical Approach – Yunus Cengel, Boles / TMH.
2. Heat Transfer / HOLMAN/TMH.
3. Engineering Heat and Mass Transfer – Sarit K. Das / Dhanpat Rai Pub.
4. Heat and Mass Transfer – R. Yadav /CPH.
5. Essential Heat Transfer - Christopher A Long / Pearson Education.
6. Heat Transfer-P.K.Nag /TMH.
7. Heat Transfer –Ghoshdastidar/Oxford University press.

COURSE OUTCOMES :

1. Ability to analyze the basic heat transfer concepts and their practical relevance in Plates, Cylinders and Spherical components.
2. Ability to solve practical problems of steady and unsteady state heat transfer.
3. Ability to develop skills to identify suitable Nusselt number empirical correlation for Plates, Cylinders.
4. Ability to design simple heat exchanger units of moderate capacity.
5. Ability to differentiate the phase changes in boiling and condensation, and formulate the radiation heat exchange between two surfaces.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6336) REFRIGERATION AND AIR CONDITIONING

B.TECH. III YEAR –II SEM **L T P C**

3 0 0 3

Prerequisites: Thermodynamics, Thermal Engineering

COURSE OBJECTIVES :

1. To acquire the knowledge on the terminology used in refrigeration and air-conditioning.
2. To demonstrate the Vapour Compression Refrigeration system.
3. To learn the performance and cycle analysis pertaining to vapour absorption system.
4. To explain the psychrometric processes of air-conditioning systems.
5. To describe the concepts of Air Conditioning systems and its load estimation procedures for different Air conditioning systems.

UNIT - I

Fundamentals of Refrigeration and Refrigerants: Introduction - Necessity and applications, unit of refrigeration and C.O.P - Heat Engine, Refrigerator and Heat pump - Types of Refrigeration systems, and its Applications. Classification of refrigerants - Desirable properties – Nomenclature - Commonly used refrigerants - Alternate refrigerants – Green house effect, global warming
Air Refrigeration System: Introduction - Air refrigeration system working on Reversed Carnot cycle – Air refrigeration system working on Bell Coleman cycle – COP - Open and Dense air systems, Applications.

UNIT - II

Vapour Compression Refrigeration System: Working principle - Simple vapour compression refrigeration cycle – COP - Representation of cycle on T-S and P-h charts - Effect of Sub cooling and Superheating - Actual Vapour compression cycle and its applications.

VCR System Components: Compressors - Classification-Working - Condensers – Classification - Working - Evaporators –Classification - Working, Expansion devices – Types-Working.

UNIT - III

Vapour Absorption Refrigeration System: Description and working of Aqua - Ammonia system - Calculation of maximum COP - Lithium Bromide - Water system - Principle of operation of Three fluid absorption system, Applications.
Steam Jet Refrigeration System and Non Conventional Refrigeration Systems: Principle of working – Analysis - Applications. Thermo electric

Refrigeration, Vortex tube refrigeration, adiabatic demagnetization Refrigeration.

UNIT - IV

Psychrometry: Introduction - Psychrometric properties and relations - Psychrometric chart Psychrometric processes - Sensible, Latent and Total heat – Sensible Heat Factor and Bypass Factor.

Human Comfort: Thermodynamics of Human body - Effective temperature – Comfort chart.

UNIT - V

Air Conditioning Systems: Introduction - Components of Air conditioning system - Classification of Air conditioning systems Central and Unitary systems - Summer, Winter and Year round systems- Cooling load estimation.

Design Of Air Condition Systems: Summer air conditioning – ADP-System with Ventilated and re-circulated air with and without bypass factor- RSHF, GSHF and ESHF.

NOTE: Refrigerants & Psychometric properties- by M.L. Mathur & F.S. Mehta data book will be supplied in the exam hall.

TEXT BOOKS :

1. C. P. Arora., Refrigeration and air conditioning - TMH, 2nd Edition, 2000.
2. S. C. Arora, Domkundwar, A course in refrigeration and air conditioning- Dhanapat Rai& sons 5th Edition 1997. R. Dossat, Principles of Refrigeration - - Pearson 4th Edition 2001**.**

REFERENCE BOOKS :

1. R. Dossat, Principles of Refrigeration - - Pearson 4th Edition 2001.
2. Manohar Prasad, Refrigeration and Air conditioning, New Age international, 2003.
3. Jones W P, “Air Conditioning Engineering”, Elsevier Butterworthy- Heine Mann, 2005.
4. Ananthanarayanan.P.N, “Basic Refrigeration and Air Conditioning”, Tata McGraw Hill, 3rd edition, New Delhi, 2006.
5. Stocker W F and Jones J W, “Refrigeration & Air Conditioning” McGraw Hill Book Company, 1985.

COURSE OUTCOMES :

1. Ability to demonstrate the basic concepts of refrigeration and related performance parameters.
2. Ability to analyze the performance of Vapour Compression system.
3. Ability to illustrate different Vapour Absorption Refrigeration systems
4. Ability to demonstrate psychrometric properties and processes used in Air Conditioning.
5. Ability to design and develop the Air-conditioning systems for Human comfort conditions.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6337) ADVANCED STRENGTH OF MATERIALS

B.TECH. III YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To familiarize the concepts of shear center and unsymmetrical bending.
2. To learn the continuous beam problems and curved beams.
3. To familiarize the concept of torsion and rotating disc of uniform strength.
4. To acquire the knowledge columns subjected to eccentric axial loads.
5. To learn concept of contact stresses.

UNIT - I

SHEAR CENTER AND UNSYMMETRICAL BENDING: Bending axis and shear center – Shear center for axi-symmetric and unsymmetrical sections – Bending stresses in beams subjected to non-symmetrical bending – Deflection of straight beams due to non-symmetrical bending.

UNIT - II

CURVED BEAM THEORY: Introduction – Stresses in curved beams – Winkler Bach theory – Limitations - Design of crane hooks– Closed ring subjected to concentrated and uniform loads.

CONTINUOUS BEAMS: Clapeyron's theorem of three moments – Beams with constant and varying moment of inertia**.**

UNIT - III

TORSION: St.Venant's approach - Prandtl approach – Membrane analogy – Torsion of thin walled open and closed sections**.**

CENTRIFUGAL STRESSES: Introduction – Rotating ring – Rotating disc- Rotating disc of uniform strength.

UNIT - IV

COLUMNS: Buckling and stability – Columns with pinned ends – Columns with other support conditions -Limitations of Euler's formula – Rankin's formula – Columns with eccentric axial loads – Secant formula**.**

UNIT - V

THIN WALLED PRESSURE VESSELS: Circumferential and longitudinal stresses – Riveted cylindrical boilers –Wire bound thin pipes – Cylinder with hemispherical ends.

CONTACT STRESSES: Methods of computing stress – Deflection of bodies in point and line contact applications.

TEXT BOOKS:

1. Boresi& Sidebottom Advanced Mechanics of Materials, 6th Edition- Wiley International.
2. L.S.Srinath, Advanced Mechanics of Solids, Tata McGraw Hill.

REFERENCE BOOKS :

1. Dr. Sadhu Singh, Strength of Materials, Khanna Publishers.
2. Gere and Timoshenko, Mechanics of Materials, CBS Publishers & Distributers.
3. Seely and Smith, Advanced Mechanics of Materials, John Wiley International Edn.

COURSE OUTCOMES :

1. Ability to develop an approximate solution for the location of shear centre.
2. Ability to analyze the torsion problems of circular cross section.
3. Ability to analyze the local buckling of thin wall flanges of elastic columns.
4. Ability to apply the knowledge of curved beams in the field of engineering.
5. Ability to define the maximum principle and shear contact stresses between two ideal elastic bodies.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6338) THEORY OF METAL CUTTING

B.TECH. III YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

This course will develop graduates knowledge in/on

1. Geometry of single and multi point cutting tools and various types of tool reference systems.
2. Mechanics of metal cutting and chip formation models in metal cutting.
3. Measurement of cutting forces and temperatures in metal cutting operations.
4. Tool wear, tool life, criteria and machinability.
5. Design of single, multi point cutting tools and press tools.

UNIT-I

Tool Materials: types of tool materials, properties and general guidelines for selection of tool materials.

Tool Geometry: Geometry of single point cutting tool. Multi-point cutting tools-geometry of peripheral milling cutters and twist drill, Types of reference system–ASA, ORS, NRS and Maximum Rake System; Conversions of tool angles - ASA and ORS system.

UNIT-II

Chip Formation: Classification of cutting operation: orthogonal and oblique machining, Mechanism of chip formation, types of chips, Factors affecting the chip formation, shear plane model, slip line model, relationship for chip geometry.

Mechanics of Chip Formation: Forces in chip formation-Cutting force analysis-Ernst and Merchant analysis-theory of Lee and Shaffer; Effect of cutting parameters on cutting forces, strain and strain rate in metal cutting and energy consideration.

UNIT-III

Measurement of Cutting Forces and Temperatures: Dynamometer-principle and construction of two, three component lathe dynamometer. Source of heat in metal cutting- temperature zones, Estimation of average cutting temperature, Measurement of cutting temperature- Tool work thermo couple.

Tool Wear and Tool life: Different causes, Types of tool wear, tool wear-measurement; Tool life – Tool life criteria, relation between cutting speed and tool life. Variables affecting tool life.

Machinability: definition, criterion for machinability –influence of variables affecting machinability.

UNIT-IV

Surface finish: effect of machining parameters on surface finish, expression for surface roughness in machining with single point cutting tool.

Cutting Fluids and Economics of Machining: Functions, properties, types and selection; Various types of costs and their estimation, determination of optimum cutting speed for maximum production rate and minimum cost criteria.

UNIT-V

Tool Design: Introduction, classification of press tools; Design of Dies- Die construction, Center of pressure, stock strip layout, press tonnage calculations, Design of piercing die, blanking die, progressive and compound dies.

Design of cutting tools: Design of single point cutting tool, drill bit, milling cutter and form tools.

TEXT BOOKS :

1. G. K. Lal , ¯Introduction to Machining Science", 3rd Edn., New Age international Publishers, 2012. (Chapters: 2 to 9).
2. P.C.Sharma, ¯ A Text Book Production Engineering", 13th Edn., S Chand & Company, New Delhi, 2009. (Chapters: 1,2,11 and 15).

REFERENCE BOOKS :

1. A. Bhattacharya, ¯Metal Cutting Theory and Practice , *Central Book Publishers*, 1st edn., Calcutta, 1984.
2. Amitabha Ghosh and A K Mallik, ¯Manufacturing Science", 4th Edn., *Associated East West Press Pvt. Ltd.*,1988.
3. Geoffrey Boothroyd and Winston A. Knight, ¯Fundamentals of Machining & Machine Tools", 3rd edn., CRC press, 2005.

COURSE OUTCOMES :

Upon completion of this course, graduates will be able to….

1. Identify the cutting tool geometry, tool material, conditions for formation of different chips and their significance in metal cutting.
2. Calculate cutting force in orthogonal machining using merchant circle diagram.
3. Measure the cutting forces, temperatures and their importance role in machining.
4. Evaluate the tool wear, tool life, machinability and proper selection of cutting fluids for economical metal cutting.
5. Select and design the various cutting and press tools.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6339) OPERATION RESEARCH

B.TECH. III YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. Graduates will be well grounded in the mathematical, engineering and modeling skills that are the basis for operations research.
2. Graduates will be prepared to apply those skills to the efficient design, analysis, operation and control of complex systems.
3. Experiences with identifying accessing evaluating and interpreting information and data in support of assignments projects or research.
4. The central objective of operations research is optimization, i.e., to do things best under the given circumstances.
5. The objectives should be clearly identified, structured as well as explicitly stated in order to achieve goals.

UNIT-I :

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.

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 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-2x2 games- dominance principle-m x 2 & 2 x n games- graphical method.

Inventory: Introduction- Single item, Deterministic models- Purchase inventory models with one price break and multiple price breaks – Stochastic models- demand may be discrete variable or continuous variable- Single period model and no setup cost.

UNIT- V: Queuing Theory :

Queuing Theory: Notation and assumption, Poisson Process, queuing models with Poisson Process input - exponential service, infinite queue-infinite source, single server model, infinite queue-infinite source, arrival theorem – pure birth process and death process M/M/1 Model, finite queue-infinite source, single server model.

TEXT BOOKS :

1. Operations Research by J.K. Sharma 4E./ MacMilan.
2. Introduction to O.R. by Hillier & Libermann/THH.

REFERENCE BOOKS :

1. Introduction to O.R. /Taha/PHI.
2. Operations Research/NVS Raju/SMS Education/ 3rd Revised Edition.
3. Operations Research / A.M. Natarajan, P. Balasubramaniam, A. Tamilarasi / Pearson Education.
4. Operations Research/Wagner/ PHI Publications.
5. Operations Research/M.V. Durga Prasad, K. Vijaya Kumar Reddy, J. Suresh Kumar/ Cengange Learning.

COURSE OUTCOMES :

1. Formulate and solve problems as graphs. Develop linear programming (LP) models for optimization problems.
2. Identify and express a decision problem in mathematical form and solve it graphically and by simplex method.
3. Recognize and formulate transportation, assignment problems and drive their optimal solution.
4. Graduates understand that game theory is to determine which outcomes are stable according to solution concept.
5. Graduates learn to calculate the traffic intensity and the utilization of some queuing systems.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6340) TRIBOLOGY

B.TECH. III YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To learn the basic concepts of Tribology and its significance.
2. To demonstrate the nature of engineering surfaces, their topography and learn about surface characterization techniques.
3. To state the principle of lubrication, theories of hydrodynamic and mixed boundary lubrication.
4. To learn about consequences of wear, wear mechanisms, wear theories and analysis of wear problems.
5. To explain the principles of bearing selection, its arrangement in machines.

UNIT - I

INTRODUTION TO TRIBOLOGY: Tribology and their characteristic feature, analysis and assessment of surface, Topography, Deterministic and Stochastic, Tribo models for asperity contacts, Techniques of surface examination, and Technological properties of surfaces.

FRICTION AND WEAR: Types of friction, Theories of friction, Study of current concepts of boundary friction and dry friction, friction reducing measures. Causes of wear, Types of wear, Mechanism of various types of wear, laws of wear, effects of wear.

UNIT - II

VISCOSITY AND LUBRICANTS: Viscosity, flow of fluids, viscosity and its variation - absolute and kinematic viscosity, temperature variation, viscosity index determination of viscosity, different viscometers used, Viscosity standards, Lubricants and their physical properties, Various theories of lubrication.

UNIT - III

THEORY OF HYDRODYNAMIC LUBRICATION: Petroffs equation, Reynolds's equation in two dimensions, bearing modulus, Somerfield number, Effects of side leakage, pressure, flow, load capacity and friction calculations, heat balance, minimum oil film thickness, oil whip and whirl.

UNIT – IV

THEORY OF HYDROSTATIC LUBRICATION: Hydrostatic step bearing, pivoted pad thrust bearing, hydrostatic lifts, hydrostatic squeeze films, pressure, flow, load capacity and friction calculations, oil rings, pressure feed bearing, partial bearings, externally pressurized bearings, Air lubricated bearing, Advantages and disadvantages.

UNIT - V

ANTI-FRICTION BEARINGSAND BEARING MATERIALS : Anti-friction bearings, types, Advantages and disadvantages, General requirements of bearing materials, types of bearing materials, General bearing design considerations.

TEXT BOOKS :

1. Basu S.K, SenGupta and Ahuja, Fundamentals of Tribology PHI Learning Private Limited, 2009.
2. Gwidon W Stachowiak and Andrew W Batchlor, Engineering Tribology, 3rd Edition, Elsevier.

REFERENCE BOOKS :

1. Sushil Kumar Srivatsava, Tribology in Industry, S. Chand &Co.
2. B.C. Majumdar, Tribology, S.Chand& Co.
3. Rabinowicz, Friction and Wear of materials, John willey& Sons.
4. Halling. J, Macmillian, Principles of Tribology.
5. Williams .J.A, Engineering Tribology, Oxford University Press.

COURSE OUTCOMES :

1. Capability to apply the concepts of principles of Tribology with particular emphasis on lubricated systems.
2. Graduates will be able to analyze the various design parameters of bearings under different loads, temperature conditions.
3. Ability to calculate the wear percentage by using different wear theories.
4. Ability to identify the wear mechanisms on rubbing surfaces.
5. Ability to design the various types of antifriction bearings, and general requirements of bearing materials.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6341) ADDITIVE MANUFACTURING

B.TECH. III YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

This course will develop graduates knowledge in/on

1. Basics of rapid prototyping process and liquid based rapid prototyping systems.
2. Solid based rapid prototyping systems.
3. Powder based rapid prototyping systems.
4. Extrusion based systems, errors in RP processes and rapid tooling techniques.
5. The rapid prototyping data formats and applications of rapid prototyping.

UNIT-I

Introduction: Introduction to Prototyping, Traditional Prototyping and Rapid Prototyping fundamentals of Rapid prototyping, Advantages and limitations of RP, Distinction between RP and CNC, other related technologies, Classification of RP, rapid prototyping process chain.

Liquid-based Rapid Prototyping Systems: Stereo lithography Apparatus (SLA): Process, working principle, photopolymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages.

UNIT-II

Solid ground curing (SGC): Process, working principle, Applications, Advantages and Disadvantages.

Solid-based Rapid Prototyping Systems: Laminated Object Manufacturing (LOM) Process, working principle, Applications, Advantages and Disadvantages.

UNIT-III

Fused Deposition Modeling (FDM): Process, working principle, Applications, Advantages and Disadvantages.

Powder Based Rapid Prototyping Systems: Selective laser Sintering (SLS), Powder fusion mechanism and powder handling, Electron Beam melting (EBM), Applications of Powder Bed Fusion Processes. Fraunhofer‘s Multiphase Jet Solidification, (MJS) , Therics inc.‘s theriform technology,Three dimensional Printing (3DP): working principle, Applications, Advantages and Disadvantages.

UNIT-IV

Extrusion-Based RP Systems: Fused Deposition Modeling (FDM), Principles, Plotting and path control, Applications of Extrusion-Based Processes.

Rapid Tooling: Conventional Tooling and Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods Errors in RP Process: Pre-processing, Processing, Post-Processing Errors, Part building errors in SLA, SLS.

UNIT-V

Rapid Prototyping Data Formats: STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats.

RP Applications: Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, GIS application, Arts and Architecture and RP Medical and Bioengineering Applications.

TEXT BOOKS:

1. Chua Chee Kai., Leong Kah Fai., Chu Sing Lim, Rapid Prototyping: Principles and Applications in Manufacturing, 2nd edn., World Scientific, 2003.

REFERENCE BOOKS :

1. Ian Gibson., David W Rosen., Brent Stucker., Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1st edn., Springer, 2010.
2. Pham D T and Dimov S S, “Rapid Manufacturing”, 1st edn., Verlag, 2001.

COURSE OUTCOMES :

Upon completion of this course, graduates will be able to

1. Explain the process, working principle and application of liquid base RP processes.
2. Explain the process, working principle and application of solid base RP processes.
3. Explain the process, working principle and application of powder base RP processes.
4. Explain the process and working principles of extrusion based RP processes.
5. Describe the rapid prototyping data formats and applications of rapid prototyping.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6325) HEAT TRANSFER LAB

B.TECH. III YEAR –II SEM **L T P C**

0 0 3 1.5

Prerequisites: Study the heat transfer subject thoroughly.

COURSE OBJECTIVES :

The objective of this heat transfer lab is to know the practical knowledge of various heat transfer modes and its applications.

List of experiments :

1. Composite Slab Apparatus — Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere.
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin.
6. Experiment on Transient Heat Conduction.
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection.
9. Parallel and counter flow heat exchange.
10. Emissivity apparatus.
11. Stefan Boltzmann Apparatus.
12. Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.
14. Film and Drop wise condensation apparatus.

COURSE OUTCOMES :

1. Ability to obtain the practical knowledge of heat transfer by conduction, convection, and radiations.
2. Ability to gain knowledge about how heat transfer will take place practically.
3. Ability to obtain how heat transfer takes place in extended surfaces.
4. Ability to analyze about phase changes in different applications like heat exchanger, boiling and condensation.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J6326) PRODUCTION DRAWING PRACTICE

B.TECH. III YEAR –II SEM **L T P C**

0 0 3 1.5

COURSE OBJECTIVES :

Graduates will be able to understand

1. The need and the importance of production drawing.
2. How to make part drawing from given assembly drawings.
3. Indication of size, form and positional tolerances on the drawing sheets.
4. Surface finish and heat treatment process on the drawing sheets.
5. Notations, symbols and abbreviations on production drawings.

UNIT-I

Introduction to Production Drawing: Types of Drawings and their uses, Format of drawing sheet, title block - Machine tools elements, methods of indicating notes on drawing**.**

UNIT-II

Limits and Fits: Basic definition of terms, alpha numeric designation of limits/ fits, calculation of limits and tolerances - Types of fits, interchangeability and selective assembly - Exercises involving selection/interpretation of fits and calculation of limits.

UNIT-III

Production Drawing: Conventional practices of indicating tolerances on size and geometrical form, Position - Surface finish, surface treatments.

UNIT-IV

Part drawings: Part drawings from assembled drawings (10 No's - out of which student should draw a minimum of 8 drawings) – (Specification and indication of the above features on the drawings) - Stuffing box, Screw jack, I.C engine connecting rod, Revolving center, Square tool post, Single tool post, Steam engine cross head, Drill jig (plate type), Non return valve, Blow off cock

UNIT-V

Writing Process sheets, tolerances and surface finish for different components such as Bevel Gear, Flange & Pinion shaft.

Part drawing using Computer Aided Drafting by using AutoCAD software.

TEXT BOOKS:

1**.** K.L. Narayana, P. Kannaiah and K. Venkat Reddy, Production Drawing, New Age Intl., (P) Ltd., Revised Edition, 1997**.**

2. P. Narasimha Reddy, T.A. Janardhan Reddy and C. Srinivasa Rao, Production DrawingPractice, Hitech Publishers, 2001.

REFERENCE BOOKS :

1. Geometric dimensioning and tolerancing- James D. Meadows/ B.S Publications.

2. Engineering Metrology, R.K. Jain, Khanna Publications.

COURSE OUTCOMES :

On completion of the course the graduates will develop abilities to

1. Draw part drawings from given assembly drawings of machine parts.
2. Indicate tolerance values on the parts drawn on sheet as per alpha numeric codes for given assembly drawings.
3. Indicate form tolerances and position tolerances on the parts drawn on the sheet as per universally accepted norms for a given assembly drawing.
4. Indicate values of surface finished and heat treatment process on the parts drawn for a given assembly drawings.
5. Write process sheet for every part that is drawn from given assembly drawings.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J7327) METROLOGY AND INSTRUMENTATION

B.TECH. IV YEAR –I SEM **L T P C**

2 1 0 3

COURSE OBJECTIVES :

1. To Learn the basics of measurement system and experimental errors.
2. To differentiate about linear, angular and optical measuring instruments.
3. To familiarize with surface roughness measurement and limits and fits.
4. To describe about measurement of Displacement, Stress and Strain, and Force and Torque.
5. To explain about measurement of Pressure, Fluid flow and Temperature.

UNIT- I

System of limits and Fits: Theory of limits, fits and tolerances – Fundamental deviation – types – Grades of tolerances – Fits – Types of fits - Hole basis and shaft basis systems – Interchangeability and selective assembly. Limit Gauges - Taylor's principle – GO and NO GO gauges – plug and ring gauges.

Linear, Angle, Taper and Optical Measurements: Slip gauges – Dial indicators – Micrometer. Bevel protractor – Angle slip gauges —sine bar – Optical flats – NPL Interferometer.

UNIT – II

Surface roughness measurement : Surface roughness and surface texture – Numerical assessment of surface finish – CLA – RMS- Ten point height of irregularity - Measuring Instruments - Profilograph – Talysurf.

Screw Thread Measurement and Gear Measurement: Element of measurement-errors in Screw Thread –Measurement of effective diameter using 2-wire and 3-wire method, angle of thread and thread pitch. Gear tooth profile measurement, measurement of diameter, pitch pressure angle and tooth thickness.

UNIT-III

Basic principle of measurement-Generalized configuration and functional description of measuring instruments. Static and dynamic characteristics.

Displacement measurement: Theory and construction of various transducers to measure displacement - Piezo electric, Inductive, Capacitance and Resistance type transducers.

Strain measurement: Various types of strain measurements, electrical resistance strain gauge, gauge factor - configurations to measure tensile, compressive and bending strains.

UNIT-IV

Temperature Measurement: various principles of temperature measurements, expansion thermometers, resistance thermometers, thermistors, thermocouples, pyrometers.

Pressure Measurement: classification-different principles used. Bourdon pressure gauges, bellows, and diaphragm gauges. Low pressure measurement-thermal conductivity gauges, ionization pressure gauges, McLeod pressure gauge.

UNIT –V

Measurement of Speed: Mechanical and electrical tachometers, Stroboscope and non contact type tachometers.

Measurement of acceleration and vibration: Principles of seismic instruments-vibrometer and Accelerometer.

TEXT BOOKS :

1. Engineering Metrology by R.K.Jain, 20th ed., Khanna Publishers New Delhi, 2009.
2. Instrumentation and mechanical measurements by A.K.Tayal, Galgotiya publications.

REFERENCE BOOKS :

1. A.K, Sawhneypuneet " A course in Mechanical Measurements and instrumentation control" DhanpatRai publications, 12thEdition, 2012.
2. J.P. Holman, Experimental Methods for Engineers, McGraw Hill.
3. Ernest O. Doebelin, Measurement systems Application and Design, International Student Edition, 4thEdition, McGraw-Hill Book Company, 1998.
4. M. Mahajan, A text book of Metrology, DhanpatRai& Co.
5. I C Gupta, Engineering Metrology, DanpathRai.

COURSE OUTCOMES :

1. Ability to apply different measuring techniques in quality control departments of industries and to ensure quality of products.
2. Ability to design and use effectively the instruments for measure linear, angular and optical.
3. Ability to analyze measuring systems of surface roughness and perform alignment/acceptance test effectively.
4. Ability to design and use effectively the instruments for measuring stress, strain, force, torque etc.
5. Ability to analyze measuring systems of Pressure, Fluid flow and Temperature.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J7329) CAD/CAM

B.TECH. IV YEAR –I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To summarize the appraisal of computers in design and manufacturing fields.
2. To explain about the modeling of geometry using various entities and methodology.
3. To learn about principles and different aspects of Numerical control and part programming.
4. To describe the requisition for Group technology and FMS for advanced manufacturing firms.
5. To illustrates about distinctive CAQC techniques and implementation of CIM in manufacturing.

UNIT - I

FUNDAMENTALS OF CAD: Introduction – The design process – The application of computers for design- Engineering data management– Benefits of CAD.

COMPUTER GRAPHICS: Raster scan graphics-Coordinate systems-Database structure for graphics modeling-Transformation of geometry: Translation, scaling, reflection, rotation, homogeneous transformations Concatenated transformations.

UNIT – II

GEOMETRIC MODELING: REPRESENTATION OF CURVES**:** Introduction, wireframe models, wireframe entities, curve representation, parametric representation of analytical curves, parametric representation of Bezier and B-Spline curves.

REPRESENTATION OF SURFACES AND SOLIDS: Introduction to surfaces, surface models surface entities. Introduction to solids, solid models, solid entities, Fundamentals of solid modeling, Boundary representation, CSG representation, sweep representation.

UNIT – III

COMPUTER NUMERICAL CONTROL: Introduction – NC modes – NC elements -NC Coordinate systems – Structure of CNC Machine Tools – Spindle design –Spindle drives – Feed drives – actuation systems.

PART PROGRAMMING: Part programming Fundamentals – Manual part programming- computer aided part programming: APT Language.

UNIT - IV

GROUP TECHNOLOGY: Introduction – part families – part classifications and coding – OPITZ system – MICLASS system – CODE system – GT Machine cells – Benefits of GT – CAPP: Retrieval type and generative type.

FLEXIBLE MANUFACTURING SYSTEM: Introduction – FMS components – Benefits of FMS – FMS planning and implementation Issues.

UNIT - V

COMPUTER AIDED QUALITY CONTROL: Introduction –computers in QC – Contact Inspection methods – Non contact inspection methods: optical, non optical – Computer Aided Testing-Integration of CAQC with CAD/CAM.

COMPUTER INTEGRATED MANUFACTURING SYSTEMS: Introduction– Integration- CIM implementation – Benefits of CIM – Lean manufacturing.

TEXT BOOKS :

1. MikelP.Groover and Emory W.Zimmers, CAD/CAM-prentice Hall of India private Ltd.New Delhi, 20thedition, May 2010.
2. Ibrahim Zeid, Mastering CAD/CAM, TATA McGraw-Hill publishing CO.Ltd, New Delhi2011.

REFERENCE BOOKS :

1. PN Rao,CAD/CAM Principle and applications, Tata McGraw Hill Education Private Ltd,New Delhi,8th edition 2013.
2. P.Radhakrishnan,S.Subramanyam&V.Raju,CAD/CAM/CIM,New Age International Publishers,3rd edition 2010.
3. MikelP.Groover,Automaiton,Production Systems and Computer Integrated Manufacturing, Prentice Hall of India private Ltd.New Delhi, 3rd edition, May 2008.
4. Ibrahim Zeid and R. Sivasubramanian, CAD/CAM theory and practice, Tata McGraw Hill publishing Co. Ltd,New Delhi 2009.
5. Tien-Chienchang, Richard A.Wysk and HSU-Pin (Ben) Wang, “Computer Aided Manufacturing”,3rdedition,2006.
6. Michael E.Mortenson,”Geometric Modelling”, John Wiley and sons, Inc., James D.Foley, Andries Van Dam, Steven K.Feiner, John F. Hughes, “Computer Graphics Principles and Practice”, Addison-Wiley publishing Company,2nd Edition 2007.

COURSE OUTCOMES :

1. Ability to apply CAD/CAM principles for geometric modelling, design and manufacturing.
2. Ability to generate codes for part profiles and can accomplish machining.
3. Ability to codify the part using GT codes and can apply GT system in automated manufacturing firm.
4. Ability to familiarize cognizant of CAQC techniques that are to be applied in manufacturing.
5. Ability to comprehend the applications of Computer Integrated Manufacturing.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J7342) POWER PLANT ENGINEERING

B.TECH. IV YEAR –I SEM **L T P C**

3 0 0 3

Prerequisites: Thermal Engineering-II

COURSE OBJECTIVES :

1. To learn about features and performance of a thermal power plant cycle.
2. To distinguishes about diesel engine and gas turbine power plants.
3. To illustrate about the hydroelectric and nuclear power plants.
4. To explain about nonconventional power plants.
5. To interpret the procedure of power tariff calculations and economics of power generations.

UNIT - I

Introduction: Various Energy sources - Types of power plants - Resources and Development of Power in India.

Steam power plant: Plant Layout - Working of Different circuits - Types of Coal - Coal handling systems - Coal storage - Overfeed and underfeed fuel beds -Pulverized Fuel burning system - Ash handling systems - Dust collection and its disposal - Mechanical type - Electrostatic Precipitator - Cooling Towers and heat rejection.

UNIT - II

Diesel power plant: Plant layout with auxiliaries - Fuel storage and Fuel supply system- Air supply system - Exhaust system - Water cooling system - Lubrication system - Starting system - Supercharging - Advantages and Disadvantages of Diesel plants over Thermal plants.

Gas turbine plant: Introduction - Classification - Layout with auxiliaries - Principles of working of Closed and Open cycle gas turbines - Combined cycle power plants and comparison.

UNIT - III

Hydro electric power plant: Hydrology - Hydrological cycle – Rainfall - Run off Hydrograph - Flow duration curve - Mass curve - Site selection of hydro plant - Typical layout - Different types of hydro plants.

Nuclear power plant: Nuclear Fission and Fusion - Nuclear Fuels – Breeding - Components of Reactor - Types of Nuclear Reactors - Pressurized water reactor(PWR) - Boiling water reactor(BWR) - CANDU reactor - Gas cooled reactor - Liquid metal cooled reactor - Fast Breeder Reactor - Nuclear waste and its Disposal.

UNIT - IV

Power from non-conventional sources: Solar power plants - Utilization of Solar collectors - Principle of working of Wind energy – Types – HAWT, VAWT - Tidal Energy.

Direct energy conversion system: Solar cell - Fuel cell - Thermo Electric and Thermo ionic conversion system - MHD generation.

UNIT - V

Power plant economics: Fixed cost - Operating cost - Fluctuating loads - General arrangement of Power Distribution - Load curves - Load duration curve - Connected load - Maximum demand - Demand factor - Average load - Load factor - Diversity factor - Plant capacity factor.

Pollution and control: Introduction - Particulate and gaseous pollutants - Air and Water pollution by thermal power plants and its control - Acid rains - Methods to control pollution.

TEXT BOOKS :

1. P.C.Sharma, Power Plant Engineering, 9th Revised & Reprint Edition 2012 S.K.Kataria&sons.
2. Arora & Domkundwar, A course in Power Plant Engineering- Dhanpat Rai & Company 5th Revised Reprint Edition, 2004.

REFERENCE BOOKS :

1. R.K.Rajput, a Text book of Power Plant Engineering, Laxmi Publications, 2nd Edition 2001.
2. P.K.Nag, Power Plant Engineering, 3rd Edition, 2008 TMH, New Delhi.
3. M.M.ElWakil, Power plant technology, 3rd Edition 2010 TMH.
4. G.R.Nagpal, Power plant engineering, Khanna Publishers.14th Edition 2000.
5. K.K.Ramalingam, “Power Plant Engineering “, Scitech Publications, 2002.
6. G.D.Rai, “Introduction to Power Plant technology” Khanna Publishers, 1995.

COURSE OUTCOMES :

1. Ability to develop awareness on different types of power generation systems.
2. Ability to differentiate conventional and non conventional power plants.
3. Ability to distinguish between polluting and non polluting power plants.
4. Ability to acquire knowledge on the economic viability of various power generation systems.
5. Ability to apply the power plant engineering concepts practically in developing low cost systems.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J7343) AUTOMATION IN MANUFACTURING

B.TECH. IV YEAR –I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To Emphasis of Automation and Production systems in manufacturing area.
2. To Automate in Material handling systems, transport systems, storage systems.
3. To Frame references on manufacturing systems and manufacturing cells in production.
4. To explain distinctive functions of Manual and automated production lines.
5. To Optimize in Adaptive Control systems and applications of Adaptive Control systems.

UNIT – I

INTRODUCTION TO AUTOMATION: Basic elements of automated system, advanced automation functions, levels of automation. Production System Facilities, Manufacturing Support systems, Automation in Production systems, Automation principles & Strategies.

UNIT – II

AUTOMATED MATERIAL HANDLING: Types of equipment, considerations in material system design, the ten principles of material handling.

MATERIAL TRANSPORT SYSTEMS: Industrial trucks, automated guided vehicle systems, rail guided vehicles, conveyor systems, cranes and hoists.

STORAGE SYSTEMS: Storage system performance, storage location strategies conventional storage methods and equipment, automated storage systems.

UNIT – III

INTRODUCTION TO MANUFACTURING SYSTEMS: Components of a Manufacturing system, Classification of Manufacturing Systems, overview of Classification Scheme, manufacturing progress functions.

SINGLE STATION MANUFACTURING CELLS: Single Station Manned Workstations and Single Station Automated Cells, applications, analysis of single station cells.

UNIT – IV

MANUAL ASSEMBLY LINES: fundamentals, alternative assembly systems, design for assembly, analysis of single model assembly lines, line balancing algorithms, mixed model assembly lines.

AUTOMATED FLOW LINES: Fundamentals of automated production lines, applications of automated production lines, analysis of transfer lines with no internal storage, analysis of transfer lines with storage buffers.

UNIT – V

AUTOMATED ASSEMBLY SYSTEMS: Fundamentals, design for automated assembly, quantitative analysis of assembly systems.

ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

TEXT BOOKS :

1. Mikell P. Groover,"Automation, Production systems and computer integrated manufacturing", prentice Hall of India Private Ltd, New Delhi,3rd edition, 2008.
2. Yoramkorem,"Computer Control of Manufacturing Systems", Tata McGraw Hill publishing company private Ltd,New Delhi.

REFERENCE BOOKS :

1. P.Radhakrishan, S.Subramanyan, V.Raju, "CAD/CAM/CIM", New age International publishers, 3rd edition, 2010.
2. Pessan David W,"Industrial Automation" first edition, Wiley publishers, 2011.
3. W.Buekinsham"Automation", PHI publications.

COURSE OUTCOMES :

1. Ability to Accomplish automation in manufacturing industry.
2. Ability to apply the techniques of Automation material handling and storage equipments depending upon the application.
3. Ability to analyze progress functions of manufacturing systems.
4. Ability to apply various algorithms to solve manual and automated flow lines.
5. Ability to apply the optimized Adaptive Control System in automation.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J7344) MECHANICS OF COMPOSITE MATERIALS

B.TECH. IV YEAR –I SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To explain problems on macromechanical behavior of lamina.
2. To discriminates problems on micromechanical behavior of lamina.
3. To analyze problems on macromechanical behavior of laminate.
4. To identifies problems on bending, buckling, and vibration of laminated plates and beams.
5. To obtain laminate behavior using a computer program.

UNIT I

Introduction to composite materials: Definition-Matrix materials-polymers-metals-ceramics - Reinforcements: Particles, whiskers, inorganic fibers, metal filaments- ceramic fibers- fiber fabrication- natural composite wood, Jute - Advantages and drawbacks of composites over monolithic materials. Mechanical properties and applications of composites, Particulate-Reinforced composite Materials, Dispersion-Strengthened composite, Fiber-reinforced composites Rule of mixtures-Characteristics of fiber-Reinforced composites, Manufacturing fiber and composites.

UNIT II

Manufacturing of composites: Manufacturing of Polymer Matrix Composites (PMCs)-handlay-up, spray technique, filament winding, Pultrusion, Resin Transfer Moulding (RTM)-, bag moulding, injection moulding, Sandwich Mould Composites (SMC) – Manufacturing of Metal Matrix Composites (MMCs) – Solid state, liquid state,vapour state processing, Manufacturing of Ceramic Matrix Composites (CMCs) –hot pressing-reaction bonding process-infiltration technique, direct oxidation- interfaces.

UNIT III

Introduction, lamina constitutive equations: Lamina Constitutive Equations: Lamina Assumptions – Macroscopic Viewpoint. Generalized Hooke's Law. Reduction to Homogeneous Orthotropic Lamina – Isotropic limit case, Orthotropic Stiffness matrix (Qij), Definition of stress and Moment Resultants. Strain Displacement relations. Basic Assumptions of Laminated anisotropic plates. Laminate Constitutive Equations – Coupling Interactions, Balanced Laminates, Symmetric Laminates, Angle Ply Laminates, Cross Ply Laminates. Laminate Structural Moduli. Evaluation of Lamina Properties from Laminate Tests. Quasi-Isotropic Laminates. Determination of Lamina stresses within Laminates.

UNIT IV

Lamina strength analysis and analysis of laminated flat plates: Introduction – Maximum Stress and Strain Criteria. Von-Misses Yield criterion for Isotropic Materials. Generalized Hill's Criterion for Anisotropic materials. Tsai-Hill's Failure Criterion for Composites. Tensor Polynomial (Tsai-Wu) Failure criterion. Prediction of laminate Failure Equilibrium Equations of Motion. Energy Formulations. Static Bending Analysis. Buckling Analysis. Free Vibrations – Natural Frequencies.

UNIT V

Thermal analysis: Assumption of Constant Co-efficient of Thermal Expansion (C.T.E.) – Modification of Hooke's Law. Modification of Laminate Constitutive Equations. Orthotropic Lamina C.T.E's. C.T.E's for special Laminate Configurations – Unidirectional, Off-axis, Symmetric Balanced Laminates, Zero C.T.E laminates, Thermally Quasi-Isotropic Laminates.

TEXT BOOKS :

1. Madhujit Mukhopadhyay, "Mechanics of Composite Materials and Structures", University Press (India) Pvt. Ltd., Hyderabad, 2004 (Reprinted 2008).
2. Chung, Deborah D.L., "Composite Materials: Science and Applications", Ane Books Pvt. Ltd./Springer, New Delhi, 1st Indian Reprint, 2009.

REFERENCE BOOKS :

1. Gibson, R.F., Principles of Composite Material Mechanics, McGraw-Hill, 1994, Second Edition – CRC press in progress.
2. Hyer, M.W., "Stress Analysis of Fiber – Reinforced Composite Materials", McGraw-Hill, 1998.
3. Issac M. Daniel and Ori Ishai, "Engineering Mechanics of Composite Materials", Oxford University Press-2006, First Indian Edition – 2007.
4. Mallick, P.K., Fiber –"Reinforced Composites: Materials, Manufacturing and Design", Maneel Dekker Inc, 1993.
5. Halpin, J.C., "Primer on Composite Materials, Analysis", Techomic Publishing Co., 1984.
6. Agarwal, B.D., and Broutman L.J., "Analysis and Performance of Fiber Composites", John Wiley and Sons, New York, 1990.
7. Mallick, P.K. and Newman, S., (edition), "Composite Materials Technology: Processes and Properties", Hansen Publisher, Munish, 1990.

COURSE OUTCOMES :

1. Ability to categorizes of types, manufacturing processes, and applications of composite materials.
2. Ability to identifies problems on macromechanical behavior of lamina.
3. Ability to analyze problems on micromechanical behavior of lamina.
4. Ability to analyze problems on macromechanical behavior of laminate.
5. Ability to analyze problems on bending, buckling, and vibration of laminated plates and beams.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J7328) METROLOGY AND INSTRUMENTATION LAB

B.TECH. IV YEAR –I SEM **L T P C**

0 0 3 1.5

COURSE OBJECTIVES :

1. To learn the main principle on which different instruments operate and provide hands on experience on them.
2. To generate knowledge and skill in use of precision instruments.
3. To learn a basic understanding of various instruments used in linear and angular measurements.
4. To get familiarize with usage of tool makers microscope.
5. To learn a basic understanding of the instruments used for measurement of pressure, temperature, flow etc.

List of experiments to perform :

Section (A) :

1. Measurement of lengths, heights, diameters by vernier calipers micrometer etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height and tooth thickness of spur gear.
4. Machine tool alignment of test on the lathe.
5. Machine tool alignment test on milling machine.
6. Tool maker's microscope and its applications.
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Effective diameter of screw thread measurement by Two wire/ Three wire method/Tool makers microscope.
9. Surface roughness measurement by Taly Surf.

Section (B) :

1. Calibration of pressure Gauge.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.

7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotometer for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of McLeod gauge for low pressure.

Note: Any 6 Experiments to be performed from each section.

COURSE OUTCOMES :

1. Ability to develop quality standards of engineering products in industries.
2. Ability to demonstrate work in quality control departments of industries and to ensure quality of products.
3. Ability to analyze the measurement of the surface roughness and perform alignment tests.
4. Ability to develop the ability to apply the principles in instruments and measuring techniques.
5. Ability to demonstrate work in designing the instrumentation for a particular purpose and special purpose devices.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J7330) CAD/CAM LAB

B.TECH. IV YEAR –I SEM **L T P C**

0 0 3 1.5

COURSE OBJECTIVES :

1. To design of part modeling and assembly.
2. To model complex shapes including freeform curves and surfaces.
3. To analysis of various parts using application software.
4. To Implement CNC programs for milling and turning machining operations, - Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.

CAD :

- Solid modeling –Extrude, Revolve, Sweep…etc.
- Surface modeling –Extrude, Sweep, Trim...etc and Mesh of curves, Free form etc.
- Feature manipulation – Copy, Mirror, Edit, Pattern, Suppress, History operations etc.
- Assembly-Constraints, Exploded Views, Interference check.
- Drawing - Layouts, Standard & Sectional views, plotting. Exercises in Modeling, Assembly and Drawing of Mechanical Components - using Parametric and feature based Packages like Pro/E.

FEA :

Structural analysis, thermal analysis and Modal analysis of various parts using ANSYS.

CAM :

- Study of G-Codes and M-Codes used in CNC Machines.
- CNC Part Programming by using G-Codes and M-Codes.
- Development of CNC code for free form and sculptured surfaces using CAM packages.
- Machining of simple components on CNC Lathe and CNC Mill by CNC Programming.

Software Packages: Pro/E, ANSYS, Cut viewer etc.

COURSE OUTCOMES :

1. Able to model and assemble the various parts using Pro/E software.
2. Able to Model complex shapes including freeform curves and surfaces.
3. Able to perform analysis of various parts using ANSYS software.
4. Able to Implement CNC programs for milling and turning machining operations, - Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J8345) UNCONVENTIONAL MACHINING PROCESSES

B.TECH. IV YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To explain the concepts of various unconventional machining processes.
2. To familiarize the use of ultrasonic and abrasive jets metal removal processes parameters.
3. To get acquitted with electrochemical machining processes.
4. To familiarize the use of Thermal metal removal processes in unconventional machining process.
5. To familiarize the use of EBM,LBM and Plasma metal removal processes.

UNIT – I

Introduction – Need for non-traditional machining methods-classification of modern machining processes – considerations in process selection. materials and applications.

UNIT – II

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

Abrasive jet machining, Water jet machining and abrasive water jet machine, Magnetic abrasive finishing: Basic principles, equipments, process variables, and mechanics of metal removal, application and limitations.
Chemical machining: principle- maskants –etchants- applications.

UNIT - III

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. Problems for estimation of metal removal rate. Advantages, limitations and applications of ECM.

UNIT - IV

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 – V

Electron beam machining: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes, influence of process parameters. Advantages, limitations and applications of EBM.

Laser Beam Machining: –General Principle and application of thermal features, cutting speed and accuracy of cut.

Plasma Arc Machining: Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

TEXT BOOKS :

1. Advanced machining processes/ VK Jain/ Allied publishers.
2. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.

REFERENCE BOOKS :

1. M.K.Singh, Unconventional Manufacturing Processes / New age international.
2. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.
3. New Technology / Bhattacharya A/ The Institution of Engineers, India 1984.
4. Modern Production / Operations Management / Baffa & Rakesh Sarin.

COURSE OUTCOMES :

After completion of this course, the graduates can express different Unconventional machining processes and will be,

1. Ability to select suitable machining process for suitable materials.
2. Ability to select optimum parameters for the respective machining process.
3. Ability to influence of difference process parameters on the performance and their applications.
4. Ability to solve most relevant industrial solutions pertaining to machining of hard materials.
5. Ability to design soft tools for machining hard materials.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J8346) AUTOMOBILE ENGINEERING

B.TECH. IV YEAR –II SEM **L T P C**

3 0 0 3

Prerequisites : Internal Combustion Engines, Thermal Engineering-1

COURSE OBJECTIVES :

1. To asses components of an automobile and functions of each component.
2. To learn working of fuel injection pumps and advanced injection systems used.
3. To explain detailed study of sensors and modern Ignition systems.
4. To explain the working of transmission system components.
5. To acquire knowledge about suspension and braking systems in automobiles and Concept of steering geometry related to Vehicle dynamics applications.

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 and engine components: engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarburization, Nitriding of crank shaft.

UNIT – II

Fuel System, S.I. Engine and C.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters – carburetor – types – air filters – petrol injection. Multipoint fuel injection for S.I. Engines - Requirements of diesel injection systems, types of injection systems, fuel pump - nozzle, spray formation, injection timing, testing of fuel pumps. Common rail diesel injection systems.

Cooling system and Emission from Automobiles : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.– Pollution standards National and international – Pollution Control Techniques –Energy alternatives.

UNIT – III

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.

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.

UNIT – IV

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 – Hotch – 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 toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

Suspension System and Braking System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension 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. Automotive Mechanics – Vol. 1 & Vol. 2 / Kirpal Singh.
2. Automobile Engineering / William Crouse.

REFERENCE BOOKS:

1. Automotive Engineering / Newton Steeds & Garrett.
2. Automotive Mechanics / G.B.S. Narang.
3. Automotive Mechanics / Heitner.
4. Automotive Engines / Srinivasan.
5. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT**.** LTD.

COURSE OUTCOMES :

1. Ability to develop different components of an automobile.
2. Ability to develop the fuel feed systems in SI and CI engines, Sensors and Ignition systems.
3. Ability to design various transmission systems.
4. Ability to analyze the simple design oriented problems related to suspension systems.
5. Ability to analyze the steering systems and braking systems.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J8347) MECHANICAL VIBRATIONS

B.TECH. IV YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES: To enable the graduate to learn

1. The process of reducing the physical systems (any number of degrees of freedom) to mathematical models.
2. The process of formulating the equations with regards to mathematical models.
3. The process of finding the solutions and subsequently analyzing the physical systems for stability.
4. To develop the concept of infinite number of degrees of freedom through practical examples.
5. The process of preparing corresponding electrical circuits for physical systems and apply the concepts of electrical and mechanical analogy to ascertain their stability.

UNIT – I

UN DAMPED FREE VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS : Introduction- Differential equation – Solution of differential equation - Torsional vibrations – Equivalent stiffness of spring combinations -Springs in series – Springs in parallel – Natural frequency of a vibration system by energy method.

UNIT - II

DAMPED FREE VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS:

Introduction – Different types of dampings – Free vibrations with viscous damping – Over damped, critically damped and under damped systems - Logarithmic decrement – Viscous dampers.

UNIT - III

FORCED VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS: Introduction – Forced vibrations with constant harmonic excitation – Steady state vibrations – Forced vibration with rotating and reciprocating unbalance - Forced vibrations due to excitation of the support –Vibration isolation and transmissibility - Typical isolators and mount types – vibration measuring instruments.

UNIT - IV

TWO DEGREES OF FREEDOM SYSTEMS: Introduction – Principal modes of vibrations – Other cases of simple two degrees of freedom systems – Two masses fixed on a tightly stretched string - Double pendulum – Torsional system – Undamped forced vibrations with harmonic excitation -Undamped dynamic vibration absorber**.**

UNIT - V

MULTI DEGREE OF FREEDOM SYSTEMS: Exact analysis- Undamped free vibrations of a multi degree of freedom system – Influence coefficients – Flexibility coefficients and Maxwell reciprocal theorem – Torsional vibrations of multi rotor systems – Vibrations of geared systems - Numerical method – Determination of natural frequency of vibration by Rayleigh's method.

TEXT BOOKS :

1. G.K.Grover, Mechanical vibrations,7th edition, Nemchand& Bros.2003.
2. W.T.Thomson, Theory of vibrations, 3rd edition, CBS Publications & Distributors,1999.

REFERENCE BOOKS :

1. William W.Setio, Mechanical vibrations, Schaum outline series, 1964.
2. V.P.Singh, Mechanical vibrations, 3rd edition, DhanpatRai& Sons, 2001.
3. S.S.Rao, Mechanical Vibrations, Pearson Education, 2004.

COURSE OUTCOMES :

1. Ability to learn how to develop mathematical models for mechanical systems using mass, spring and dampers.
2. Ability to gain experience in deriving governing equations.
3. Ability to model a vibrating mechanical system, develop and solve its governing equations in order to obtain the response of the system under various types of excitation conditions.
4. Ability to learn how to interpret the response of a mechanical system and use the response information in its design and testing in both time and frequency domains.
5. Ability to asses the sources of vibration and noise in machines and make design modifications to reduce the vibration and noise and improve the life of the components for smooth operation.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J8348) COMPUTATIONAL FLUID DYNAMICS

B.TECH. IV YEAR –II SEM **L T P C**

3 0 0 3

Prerequisites: Fluid Mechanics and Heat Transfer.

COURSE OBJECTIVES :

1. To describe the elements of computational methods of fluid flow.
2. To infers about the application of CFD to different fields of engineering.
3. To distinguish the flow fields and the behavior of fluid, combustion etc.,
4. To explain the solutions to the complicated problems by using the techniques of CFD.
5. To identifies the Finite difference equations in Heat Transfer.

UNIT - I

INTRODUCTION: Computational Fluid Dynamics as a Research and Design Tool, Applications of Computational Fluid Dynamics.

GOVERNING EQUATIONS OF FLUID DYNAMICS: Introduction, Control Volume, Substantial Derivative, Divergence of Velocity, Continuity Equation, Momentum Equation and Energy Equation.

UNIT - II

MATHEMATICAL BEHAVIOR OF PARTIAL DIFFERENTIAL EQUATIONS: Introduction, Classification of Quasi-Linear Partial Differential Equations, Eigen Value Method, Hyperbolic Equations, Parabolic Equations, Elliptic Equations.

UNIT - III

BASICS ASPECTS OF DISCRETIZATION: Introduction, Introduction of Finite Differences, Difference Equations, Explicit and Implicit Approaches, Errors and Stability Analysis, Grid Generation.

UNIT - IV

INCOMPRESSIBLE FLUID FLOW: Introduction, Implicit Crank-Nicholson Technique, Pressure Correction Method, Computation of Boundary Layer Flow.

UNIT - V

HEAT TRANSFER: Finite Difference Applications in Heat conduction and Convention – Heat conduction, steady heat conduction, in a rectangular geometry, transient heat conduction, Finite difference application in convective heat transfer.

TEXT BOOKS:

1. John. D. Anderson, Computational fluid dynamics - Basics with applications - McGraw Hill.

REFERENCE BOOKS :

1. Anderson, D.A.,Tannenhill, I.I., and Pletcher, R.H.,Taylor and Francis Computational Fluid Mechanics and Heat Transfer.
2. Suhas V. Patankar, Numerical heat transfer and fluid flow - Butter-worth Publishers.
3. T. K Sengupta, Fundamentals of Computational Fluid Dynamics, University Press.

COURSE OUTCOMES :

1. Ability to acquire the CFD techniques for the fluid flow fields of combustion chamber of IC engines and consequently analyze the behavior of fluid.
2. Ability to analyze the effects of important parameters on the performance and efficiency of the system.
3. Ability to carry out the simulation studies for various thermal systems.
4. Ability to compares the importance of the simulation studies where there is no scope for carrying out the experimental work.
5. Ability to improve the performance and efficiency of thermal systems based on the simulation results**.**

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J8349) THEORY OF ELASTICITY

B.TECH. IV YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To describe the principles of elasticity theory and to find of stress in elastic stress analysis.
2. To explain the displacement of simple beams.
3. To acquire the knowledge analysis of linear elastic solids under mechanical loads.
4. To learn the Airy stress functions for 2-D plane stress and plane strain problems in Cartesian and cylindrical coordinate systems.
5. To understand the stress functions for rectangular and circular cross-sectional cantilever beams.

UNIT – I

ELASTICITY: Two dimensional stress analysis - Plane stress - Plane strain - Equations of Compatibility - Stress function - Boundary conditions.

PROBLEM IN RECTANGULAR COORDINATES - Solution by polynomials - Saint Venant's principles -Determination of displacement - Simple beam problems.

UNIT – II

PROBLEMS IN POLAR COORDINATES - General equations in polar coordinates - Stress distribution symmetrical about axis - Strain components in polar coordinates - Simple and symmetric problems.

UNIT – III

ANALYSIS OF STRESS AND STRAIN IN THREE DIMENSIONS - Principle stresses – Homogeneous deformations – Strain at a point – Principal axes of strain - Rotation.

UNIT – IV

GENERAL THEOREMS: Differential equations of equilibrium and conditions of compatibility – Determination of displacement - Uniqueness of solution - Reciprocal theorem.

UNIT – V

BENDING OF PRISMATIC BARS - Stress function - Bending of cantilever beam - Beam of rectangular cross-section - Beams of circular cross-section.

TEXT BOOKS:

1. Timoshenko, Goodier., Theory of Elasticity 6th Edition 2009 - McGraw Hill.
2. A.I.Lurie, Theory of Elasticity., 4th Edition 2005-Springer Verlag New York, LLC.

REFERENCE BOOKS :

1. Dr.Sadhu Singh., Applied stress analysis, Khanna Publishers.
2. Dally and Riley., Experimental stress analysis, Mc Graw-Hill.
3. LOVE .A.H., A treatise on Mathematical theory of Elasticity, Dover publications Inc.
4. A.Meceri., Theory of Elasticity, Springer.

COURSE OUTCOMES :

1. To analyze the equations of compatibility by using plane stress and plane strain conditions.
2. To apply Saint Venant's principles to determine the displacements of simple beams.
3. To analyze the stresses and strains in 3-Dimensional problems.
4. To solve the linear elasticity problems using various analytical techniques.
5. To analyze the vectors and tensors to enhance the theory of elasticity where ever necessary.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS)

(J8350) PLANT LAYOUT & MATERIAL HANDLING

B.TECH. IV YEAR –II SEM **L T P C**

3 0 0 3

COURSE OBJECTIVES :

1. To plan, analyze and design to improve manufacturing and services facilities.
2. To summarize the benefit of an efficient material handling system.
3. To demonstrate the effect process layout has on the material handling system.
4. To apply the techniques to evaluate and design material handling and storage systems.
5. To explore integrate concepts and techniques learned through this course in order to design and efficient plant layout in a team environment.

UNIT-I:

Introduction – Classification of Layout, Advantages and Limitations of different layouts, Layout design procedures, Overview of the plant lay out, Process layout & Product layout selection, specification, implementation and follow up, comparison of product and process lay out.

UNIT-II:

Heuristics for plant layout –ALDEP, CORELAP,CRAFT.

UNIT-III:

Group layout-Fixed position layout-Quadratic assignment model, Branch and bound method.

UNIT-IV:

Introduction, material handling systems, material holding properties, classification of material handling equipment, relationship of material handling to plant lay out ,Basic material handling systems: selection material handling method –path, equipment and function oriented systems.

UNIT-V:

Methods to minimize cost of Material Handling maintenance of material handling equipments, safety in handling, Ergonomics of material handling equipment, design, miscellaneous equipments.

TEXT BOOKS :

1. Operations Management/PB Mahapatra/PHI.
2. Aspects of Material handling/Dr.KC Arora & Shinde, Laxmi publiocations.

REFERENCE BOOKS :

1. Facility Layout & Location an analytical approach/ RL Francis/ LF Me Linnis Jr, White/ PHI.
2. Production and Operations Management/ R Panneerselvam/ PHI.
3. Introduction to Material handling/ Ray. Siddhartha/ New Age.

COURSE OUTCOMES :

1. Ability to analyze the importance of proper material handling and storage techniques.
2. Ability to learn proper material handling engineering techniques regarding hoisting and conveying equipment.
3. Ability to infers about toxic hazards of materials being handled, such as chemicals, dusts and poisons.
4. Ability to refer the formal training requirements for material handling personnel, especially equipment operators.
5. Ability to summarize the product line Integrate concepts and techniques learned through this course in order to design and efficient plant layout in a team environment.

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