ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

MECHANICAL ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2014-2015)

VAAGDEVI COLLEGE OF ENGINEERING
(Autonomous)
Bollikunta, Warangal – 506 005
Telangana State, India

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)
Bollikunta, Warangal – 506 005. T.S.
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Academic Regulations for B.Tech. (Regular)

(Effective for the students admitted into I-Year from the Academic year 2014-2015)

1. **Award of B.Tech. Degree**

   A student will be declared eligible for the award of the B.Tech. Degree if he 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 all credits and secure all credits with the exemption of 8 credits in elective subjects.

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

3. **Courses of Study**

   The following courses of study are offered at present for specialization for the B.Tech. Course:

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

And any other course as approved by the authorities of the college from time to time.

4. **Credits**

	For I-Year-I/II Semester		II,III,IV Years per Semester	
	Periods/Week	Credits	Periods/Week	Credits
Theory	04	04	03	04
	02	02	04	04
Practical	03	02	03	02
Drawing	03T/03D	04	03	02
Mini Project	-	-	-	02
Comprehensive Viva Voce	-	-	-	02
Seminar	-	-	02	02
Project	-	-	15	12

5. Distribution and Weightage of Marks /Credits:

i. The Performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, Industry oriented mini-project, seminar, comprehensive viva-voce and project work shall be evaluated for 50, 50, 100 and 200 marks respectively.

ii. For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.

iii. For theory subjects, during the semester there shall be 2 mid term examinations. Each mid term examination consists of Part-A (Objective Type) for 5 marks and Part-B (subjective paper) for 15 marks with duration of 90 minutes and two assignments carrying 5 marks.

Subjective paper shall contain 5 questions of which student have to answer 3 questions of each 5 marks. First mid term examination shall be conducted for 2.5 units of syllabus and second mid term examination shall be conducted for 2.5 units. First Assignment should be submitted before the conduct of the first mid term examination, and the second Assignment should be submitted before the conduct of the second mid term examination.

The total marks secured by the student in each mid term examination for 25 marks are considered and the average of the two mid term examinations shall be taken as the final marks secured by each candidate. If he is absent for any test/assignment, he is awarded zero marks for that test/assignment. However a candidate may permitted on medical grounds/extreme conditions provided he applied for makeup examinations within a week. A subcommittee will be constituted by the Academic Council to look in to such cases.

iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Out of the 25 sessional marks, day-today work in the laboratory shall be evaluated for 15 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 Chairman, Board of Studies in respective Branches.

v. For the subject having design and/or drawing, (such as Engineering Graphics Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal test.

vi. There shall be an industry-oriented mini project, in collaboration with an industry of their specialization, to be taken up during the vacation after III-year II-Semester examination. However, the mini project and its report shall be evaluated in IV Year I-Semester. The industry oriented mini project shall

be submitted in a report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

vii.   There shall be a seminar presentation in IV Year II-Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his 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 50 marks. There shall be no external examination for seminar.

viii.   There shall be comprehensive Viva-Voce in IV-Year II-Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty Members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects he/she studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce.

ix.   Out of a total of 200 marks for the project work, 50 marks shall be for internal evaluation and 150 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 supervisor of the project and a senior faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.

6. Attendance Requirements:

i.   A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of attendance in all the subjects (in each subject).
ii.   Condonation of shortage of attendance in each subject up to 10% (On genuine medical grounds) in each semester may be granted by the College Academic Council on the basis of recommendation by the Principal.
iii.   Shortage of attendance below 65% in each subject shall in no case be condoned.
iv.   Student falling short of attendance as specified above will be detained.
v.   A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek-re-admission for that semester when offered next.
vi.   Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
vii.   A stipulated fee decided by the Academic Council shall be payable towards condonation of shortage of attendance.

7. Minimum Academic Requirements:

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

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

ii. A student shall be promoted from II to III year only if he fulfills the academic requirement of 32 credits (out of 80 credits) secured from all the examinations (both regular and supplementary) conducted up to end of II-Year, excluding the performance in II-B.Tech-II-Semester examination.

iii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of 54 credits (out of 134 credits) secured from all the examinations (both regular and supplementary) conducted up to end of III-Year, excluding the performance in III-B.Tech.-II-Semester examination.

iv. A student should earn all credits with an exemption of 8 credits in elective subjects. The marks obtained in the subjects excluding the subjects exempted shall be considered for the calculation of percentage of marks.

v. Student who fails to earn credits with an exemption of eight credits as indicated in the course structure within eight academic years from the year of admission shall forfeit his seat in B.Tech. course unless an extension is given by College Academic Council to complete the course for a further period.

8. Course Pattern:

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

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. When a student is detained due to lack of credits/shortage of attendance he may be re-admitted when the semester is offered after fulfillment of academic regulations.

9. Award of Class:

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

Class Awarded	percentage of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured in the subjects excluding the subjects exempted.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The Marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

10. Minimum Instruction Days:

For each semester there shall be a minimum of 90 clear instruction days.

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

12. General:

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

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

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

iv.   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.

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

(Effective for the students getting admitted into II-Year from the academic year 2015-2016 and on wards)

1. The students have to acquire all credits from II to IV year of B.Tech. Program (Regular) for the award of the degree. Register all credits and secure all credits with the exemption of 8 credits in elective subjects.

2. 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 Academic Council to complete the course for a further period.

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

4. **Promotion Rule:**
    A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of 32 credits from the following examinations.

    a. Two regular and one supplementary examinations of II-Year I-Semester.
    b. One regular one supplementary examinations of II-Year II-Semester.
    c. One regular examination of III-Year I-Semester.

5. **Award of Class:**

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

First Class with Distinction	70% and above	From the aggregate marks secured in subjects.(i.e., II-Year to IV-Year) excluding the subjects exempted.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The Marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

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

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MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper Conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which 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 candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the 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 examinations and 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 cancelled.
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 work) already appeared and shall not be

		allowed to appear for examinations 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 performance in that subject and all the 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.
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 walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-incharge, or any person on duty in or outside the examination hall or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the 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.

	any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally 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 the 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 firearm in the examination hall.	Expulsion from the examination hall and cancellation of the 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 the 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. Person(s) who do not belong to the

		College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the 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 the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

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VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL
(AUTONOMOUS)

MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2014-15 onwards)

I YEAR   **I SEMESTER**

S.No.	Code	Subject	L	T	P	Credits
1	A91001	Mathematics-I	4	1	0	4
2	A91002	English	4	0	0	4
3	A91004	Engineering Chemistry	4	1	0	4
4	A91302	Engineering Mechanics-I	4	1	0	4
5	A91502	Computer Programming & Data Structures	4	1	0	4
6	A91005	English Language Communication Skills Lab	0	0	3	2
7	A91007	Engineering Chemistry Lab	0	0	3	2
8	A91504	Computer Programming & Data Structures Lab	0	0	3	2
		Total	**20**	**4**	**9**	**26**

I YEAR   **II SEMESTER**

S.No.	Code	Subject	L	T	P	Credits
1	A92001	Mathematics-II	4	1	0	4
2	A92002	Engineering Physics	4	1	0	4
3	A92006	Human Values and Professional Ethics	2	0	0	2
4	A92203	Basic Electrical & Electronics Engineering	4	1	0	4
5	A92301	Engineering Graphics	2	0	4	4
5	A92302	Engineering Mechanics-II	4	1	0	4
7	A92303	Engineering Workshop	0	0	3	2
8	A92008	Engineering Physics Lab	0	0	3	2
9	A92205	Basic Electrical & Electronics Engineering Lab	0	0	3	2
		Total	**20**	**4**	**13**	**28**

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL
(AUTONOMOUS)

MECHANICAL ENGINEERING

COURSE STRUCTURE

II YEAR   **I SEMESTER**

S.No.	Code	Subject	L	T	P	Credits
1	A93002	Probability & Statistics	4	1	0	4
2	A93003	Environmental Studies	4	0	0	4
3	A93301	Metallurgy & Material Science	4	0	0	4
4	A93302	Mechanics of Solids	4	1	0	4
5	A93303	Thermodynamics	4	0	0	4
6	A93304	Machine Drawing	2	0	4	2
7	A93305	Mechanics of Solids & Metallurgy Lab	0	0	3	2
8	A93306	Fuels & lubricants Lab	0	0	3	2
		Total	**22**	**2**	**10**	**26**

II YEAR   **II SEMESTER**

S.No.	Code	Subject	L	T	P	Credits
1	A94005	Computational Mathematics	2	0	0	2
2	A94205	Instrumentation & Control Systems	4	1	0	4
3	A94301	Fluid Mechanics & Hydraulic Machinery	4	1	0	4
4	A94302	Thermal Engineering-I	4	0	0	4
5	A94303	Kinematics of Machines	4	1	0	4
6	A94304	Production Technology	4	0	0	4
7	A94208	Instrumentation & Control System Lab	0	0	3	2
8	A94306	Fluid Mechanics & Hydraulic Machinery Lab	0	0	3	2
9	A94307	Production Technology Lab	0	0	3	2
10	A94006	Gender Sensitization	2	0	0	0
		Total	**24**	**3**	**09**	**28**

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL
(AUTONOMOUS)

MECHANICAL ENGINEERING

COURSE STRUCTURE

III YEAR   **I SEM**

Sl.No	Code	Subject	L	T	P	Credits
1	A95621	Managerial Economics & Financial Analysis	4	0	0	4
2	A95301	Machine Tools	4	0	0	4
3	A95302	Dynamics of Machinery	4	0	0	4
4	A95303	Design of Machine Members-I	4	0	0	4
5	A95304	Engineering Metrology	4	0	0	4
6	A95305	Thermal Engg-II	4	0	0	4
7	A95306	Metrology & Machine Tools Lab	0	0	3	2
8	A95307	Thermal Engg Lab	0	0	3	2
	Total		**24**	**0**	**6**	**28**

III YEAR   **II SEM**

S. No	Code	Subject	L	T	P	Credits
1	A96301	Finite Element Methods	4	0	0	4
2	A96302	Refrigeration & Air conditioning	4	0	0	4
3	A96303	Design of Machine Members-II	4	0	0	4
4	A96304	Heat Transfer	4	0	0	4
5		**ELECTIVE-I**	4	0	0	4
	A96305	Automobile Engineering				
	A96601	Industrial Management				
	A96306	Jet Propulsion & Rocket Engineering				
	A96105 A96106 A96204 A96307 A96308 A96413 A96414 A96512 A96513	**Open Elective** Disaster Management Air Pollution & Control Energy Storage Systems Nanotechnology Non Conventional Sources of Energy Embedded Systems & Microprocessors Principles of Communication Systems Database Management Systems Java Programming	4	0	0	4
7	A96309	Heat Transfer Lab	0	0	3	2
8	A96001	Advanced English Language and Communication Skills Lab	0	0	3	2
	Total		**24**	**0**	**6**	**28**

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VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005
(AUTONOMOUS)

MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2014-2015)

IV Year   **ISEM**

S.No	Code	Subject	L	T	P	Credits
1.	A97301	Power Plant Engineering	4	1	0	4
2.	A97302	CAD/CAM	4	1	0	4
3.	A97303	Unconventional Machining Process.	4	1	0	4
4.		**Elective-II**	4	1	0	4
	A97304	1. CNC Technology				
	A97001	2. Operations Research				
	A97305	3. Design for Manufacturing				
5.		**Elective-III**	4	1	0	4
	A97306	1. Robotics				
	A97307	2. Mechanical Vibrations				
	A97308	3. Automation in manufacturing				
6.	A97309	CAD/CAM Lab	0	0	3	2
7.	A97310	Production Drawing Practice	0	0	3	2
8.	A97311	Industry Oriented Mini Project	-	-	-	2
9.	A97312	Seminar	-	0	3	2
			20	**5**	**9**	**28**

I V Year   **II SEM**

S. No	Code	Subject	L	T	P	Credits
1.	A98301	Production Planning & Control	4	1	0	4
2.		**Elective-IV**	4	1	0	4
	A98302	1. Reliability Engineering				
	A98303	2. Mechatronics				
	A98304	3. Plant layout & Material Handling				
3.	A98307	Project Work	-	-	15	12
4.	A98308	Comprehensive viva	-	-	-	2
			8	**2**	**15**	**22**

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A91001) MATHEMATICS – I
(Common for all Branches)

I Year I-Sem   L T P C
                                                                4 1 0 4

Course Objective:

The main aim of teaching Engineering Mathematics-I is to emphasize the relevance of fundamentals and applications of Mathematics in Engineering field. Mathematics is the basic of all branches of modern business and science and technology. It deals with using the constructive results of mathematics to solve a problem in applied science or Engineering field.

It helps the students in choosing a technique that improve the quality and efficiency of actual computation.

Unit – I:

Differential calculus:
Rolle's Mean Value theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's Theorem with geometrical and algebraic interpretation (without proof). Functions of several variables-Chain Rule. Jacobian, Functional dependence, maxima and minima of functions of two variables, with constraints and without constraints-Method of Lagrange's multipliers.

Unit – II:

Ordinary differential equations of first order:
Formation of differential equations**,** solution of differential equations of First order and First degree. Exact differential equations , Linear Differential equations. Bernouli's Differential equations, Orthogonal Trajectories ,Newton's law of cooling and Natural law of growth and Decay.

Unit – III:

Ordinary linear differential equations of higher order:
Homogenous linear differential equations of higher order with constant coefficients, Non Homogenous linear differential equations of higher order of the form e^{ax}, Sinax, Cosax, Polynomials in x, $e^{ax} v(x)$, $x^k v(x)$, Cauchy-Euler equation and Lagrange's equation, Method of variation of parameters.

Unit – IV:

Improper integration and multiple integrals:
Beta and Gamma functions, properties and Relation between them Evaluation of improper integration using Beta, Gamma functions. Multiple integrals- double & triple integrals. Change of variables and change of order of integration. Finding area and volume of region.

Unit – V:

Laplace Transformation:

Laplace transform - Inverse Laplace transform - properties of Laplace transforms - Laplace transforms of unit step function, impulse function and periodic
function - convolution theorem - Solution of ordinary differential equations with constant coefficients and system of linear differential equations with constant coefficients using Laplace transform.

Recommended Text Books:

1. R. K. Jain and S. R. K. Iyengar: Advanced Engineering Mathematics,
   Narosa Publishing House, 2008
2. B. S. Grewal: Higher Engineering Mathematics, Khanna Publications, 2009.

Reference Book:

1. Erwyn Kreyszig : Advanced Engineering Mathematics, John Wiley and Sons, 8th Edition.
2. T. K. V. Iyengar: Engineering Mathematics-I, S. Chand and Company.
3. A textbook of Engineering Mathematics Vol-I by P.B.Bhaskara Rao, S.K.V.S. Rama Chary.
4. A textbook of Engineering Mathematics Vol-I by C. Shankaraiah, VGS Book Link.

Learning Outcomes:

By studying Mathematics-I students understanding the method of solving first order & higher order differential equations and they convert the trigonometric functions into algebraic function by studying mean value theorems. They understand how to find area, volume by using applications of integration. They understand how to find the solution of initial value problem without finding general solution by Laplace Technique.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A91002) ENGLISH
(Common for all Branches)

I Year I-Sem   **L T P C**
                                                                         4 0 0 4

1. INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. *However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.*

2. OBJECTIVES:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

Learning Outcomes

- Usage of correct English Language, written and spoken
- Enrichment of comprehension and fluency
- Gaining confidence in using language in varied situations

SYLLABUS:
Listening Skills:

Objectives

- 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
- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

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

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

Speaking Skills:

Objectives

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.
- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities (Using exercises from all the **six** units of the prescribed text: *Skills Annexe: Functional English for Success.***)**
- Just A Minute(JAM) Sessions.

Reading Skills:

Objectives

To develop an awareness in the students about the significance of silent reading and comprehension.

1. 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.
- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Scanning
- Recognizing coherence/sequencing of sentences

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:

- To develop an awareness in the students about writing as an exact and formal skill

- To equip them with the components of different forms of writing, beginning with the lower order ones.

Writing sentences

- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Describing graphs using expressions of comparison

4. *TEXTBOOKS PRESCRIBED:*
For Detailed study
- First Textbook entitled **"Skills Annexe -Functional English for Success",** Published by Orient Black Swan, Hyderabad
- The Second Textbook entitled **"Epitome of Wisdom",** published by Maruthi Publications, Hyderabad.

The course content and study material is divided into **Five Units.**

Unit – I:

Importance of communication in English-Globalisation-changing trends-barriers to communication

Unit –II:

- Chapter entitled '*Wit and Humour'* from 'Skills Annexe' -Functional English to Success Published   by Orient Black Swan, Hyderabad
- Chapter entitled **'Mokshagundam Visvesvaraya'** from *"Epitome of Wisdom",* Published by Maruthi Publications, Hyderabad.
                                                  and
S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal
    Situations)
R- Reading for Subject/ Theme
W- Writing Paragraphs
G-Types of Nouns and Pronouns
V- Homonyms, homophones synonyms, antonyms

Unit –III

- Chapter entitled "*Advances in Science and Technology"* from "*Skills Annexe - Functional English for Success*" Published   by Orient Black Swan, Hyderabad.
- Chapter entitled '*Three days To See'* from *"Epitome of Wisdom",* Published by Maruthi Publications, Hyderabad.

L – Listening for themes and facts
S – Apologizing, interrupting, requesting and making polite conversation
R- for theme and gist
W- Describing people, places, objects, events
G- Verb forms
V- Noun, verb, adjective and adverb

Unit –IV

- Chapter entitled *‘Risk Management’* from **“Skills Annexe -Functional English for Success”** Published by Orient Black Swan, Hyderabad.
- Chapter entitled *‘Leela’s Friend’* by R.K. Narayan from *“Epitome of Wisdom”,* Published by Maruthi Publications, Hyderabad.

and
L – for main points and sub-points for note taking
S – Giving instructions and directions; Speaking of hypothetical situations
R – Reading for details
W – Note-making, information transfer, punctuation
G – Present tense
V – Synonyms and Antonyms

Unit –V

- Chapter entitled ‘*Human Values and Professional Ethics’* from “*Skills Annexe - Functional English for Success”* Published by Orient Black Swan, Hyderabad.

- Chapter entitled *‘The Last Leaf’* from *“Epitome of Wisdom”,* Published by Maruthi Publications, Hyderabad.

and
L -Listening for specific details and information
S- Narrating, expressing opinions and telephone interactions
R -Reading for specific details and information
W- Writing formal letters and CVs
G- Past and future tenses
V- Vocabulary - idioms and Phrasal verbs
* Exercises from the texts not prescribed shall also be used for classroom tasks.

SUGGESTED READING:

1. *Contemporary English Grammar Structures and Composition* by David Green, MacMillan Publishers, New Delhi. 2010.
2. **Innovate with English: A Course in English for Engineering Students,** edited by T Samson, Foundation Books.
3. English for Employability-**K. Purushotham, Orient Blackswan** (with CD).
4. Listening & Speaking Skills **Book I and Book II, Cambridge Publishers** (with CD's).
5. English Grammar Practice**, Raj N Bakshi, Orient Longman.**
6. **Technical Communication** by Daniel Riordan. 2011. **Cengage Publications. New Delhi.**
7. **Effective English, edited** by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by **Pearson**
8. Handbook of English Grammar and Usage**, Mark Lester and Larry Beason, Tata Mc Graw –Hill.**
9. Spoken English**, R.K. Bansal & JB Harrison, Orient Longman.**
10. Technical Communication, **Meenakshi Raman, Oxford University Press**
11. Objective English **Edgar Thorpe & Showick Thorpe**, **Pearson Education**
12. Grammar Games**, Renuvolcuri Mario, Cambridge University Press.**
13. Everyday Dialogues in English**, Robert J. Dixson, Prentice Hall India Pvt Ltd.,**
14. ABC of Common Errors **Nigel D Turton, Mac Millan Publishers.**
15. Basic Vocabulary **Edgar Thorpe & Showick Thorpe**, **Pearson Education**
16. Effective Technical Communication**, M Ashraf Rizvi, Tata Mc Graw –Hill.**
17. An Interactive Grammar of Modern English, **Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO**
18. A Communicative Grammar of English, **Geoffrey Leech, Jan Svartvik, Pearson Education**
19. Enrich your English, **Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,**
20. A Grammar Book for You And I, **C. Edward Good, MacMillan Publishers.**
21. Practical English Usage **(ELBS) Michael Swan.**
22. Examine Your English – **Margaret Maison.**
23. The Parts of Speech: **P. Satyanarayana, P.C. Ray Publications,** Warangal, 2003.
24. The Tense: **P. Satyanarayana, P.C. Ray Publications,** Warangal 2003.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A91004) ENGINEERING CHEMISTRY

I Year I-SEM CIVIL, MECH. & EEE (A91004)   **L T P C**
**   II-SEM ECE & CSE (A92003)**   **4 0 0 4**

Objectives:

The purpose of these courses is to emphasize the relevance of fundamentals and applications of chemical sciences in the field of engineering. Thus, the courses have been conceived in such a way that they take into account appropriate combinations of old and new emerging concepts in the chemical sciences area and their current and potential uses in engineering. The Courses attempt to address the principles of general chemistry and specific topics relevant to various engineering disciplines, wherein the students can apply this learning in their respective areas of expertise.

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry like other subjects is the real base of their profession and that therefore they must have a good understanding of chemistry before they can use it in their profession.

Unit – 1:

Electro Chemistry
Conductors, Non-conductors, Faraday's laws, Ohm's law, conductance, specific, equivalent and molar conductance, units and their relation. Numerical Problems. Applications of conductance – conductometric titrations.
EMF: Electrochemical and Electrolytic cells, Galvanic cell, Electro chemical series, measurement of emf and single electrode potential, Nernst's equation and its applications,

Unit – 2:

Electrodes and Battery Chemistry
Introduction, Types of electrodes: Reference electrodes (SHE, SCE and QH), Ion-selective electrode-Glass electrode, applications of electrode potentials- Determination of PH and Potentiometric Titrations. Numerical Problems. Concentration cells-Electrode concentration cells and Electrolyte concentration cells. Batteries: Primary cells-Dry cell, Secondary cells - Pb-Acid storage cell, Fuel cells- Hydrogen-Oxygen fuel cell.
Solar Batteries, Relation between electrical and heat energy.

Unit –3:

Corrosion and Its control
Introduction, Causes of corrosion, Types of corrosion- Dry and Wet corrosion. Factors affecting on corrosion, Corrosion controlling methods- Cathodic protection and Surface

coatings (anodic and Cathodic), Methods of   applications of metal coatings- Hot dipping and electroplating.

Unit – 4:

Polymer Chemistry
Introduction, Functionality of Monomers, classification of polymers, Types of polymerization, Mechanism of polymerization: Chain and step. Plastics: Chemistry of Thermoplastic resins (PE, PVC, PS & Nylon) and thermosetting resins (Bakelite). Conducting Polymers- Poly acetylene, Poly aniline & Ploy pyrrole. Fibers- Poly ester, Nylon-6, 6 & Nylon 6, 10.

Unit – 5:

Water Chemistry
 Introduction, Types of hardness, units and Numerical problems, Estimation of hardness of water-EDTA method and Numerical problems, Boiler Troubles- Scale and sludge, caustic embrittlement & Boiler corrosion. Treatment of Boiler feed water- Lime-soda, Zeolite and Ion-exchange process. Numerical problems, Desalination of brackish water- Reverse Osmosis and Electro dialysis.

Text Books:

1. Text Book of Engineering Chemistry by C. Parameshwara Murthy. B.S. Publications
2. Text Book of Engineering Chemistry by Y. Bharathi kumara and Jyotsna Cherikuri, VGS Buplications.
3. Text Book of Engineering Chemistry by Shashi Chawla
4. Text Book of Engineering Chemistry by B. Ramadevi & Ch. Venkata Ramana Reddy, CENGAGE Learning 2012.

Reference Books:

1. Elementary principles of Physical Chemistry by P.W. Atkins, Oxford University Press.
2. Physical Chemistry by Puri & Sharma
3. Engineering Chemistry by Jain & Jain
4. Engineering Chemistry by Shashi Chawla.
5. Polymer Chemistry by Gourikar.
6. Physical Chemistry Glastone.

Learning Outcomes:

1. Applications of electrochemistry understanding different types of cells, their representation, knowledge of electrode potentials, utilization of electrical energy and conversation into different energies.
2. Applicability of electrodes in different fields of analysis.

3. Understanding the utility of batteries as a source of energy in many electronic gadgets & their types.
4. Enhancement of power generation by making of fuel cells. Knowledge of need for alternate source of energy.
5. Deterioration of metal under the influence of environment, mechanism of corrosion, factors affecting corrosion, prevention of corrosion using various methods & a basic knowledge of surface coatings.
6. Improving the properties of plastics by various additives, integral role of various polymers in our life style & applicability of plastic in automobile and textile industry.
7. Knowledge of hardness of water and its effect, industrial utility of water especially for steam generation, removal methodologies of hardness & treatment of brackish or salty water.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A91302) ENGINEERING MECHANICS-I

I Year I Sem: Civil & Mech

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
1. Understand the basic principles of static's applicable to rigid bodies in equilibrium
2. Apply static principles to the solution of a variety of practical problems.
3. Determine the component of force in space.
4. Determine the centre of gravity of Simple figures, composite figures and its applications
5. Determine the Moment of inertia of Simple figures, composite figures and its applications
6. Determine mass moment of inertia of simple objects, composite bodies.
7. Determine the Frictional Forces when the bodies are under motion.

UNIT – I
Introduction to Engineering Mechanics – Basic Concepts.
Resultants of Force System: Parallelogram law –Forces and components- Resultant of coplanar Concurrent Forces – Components of forces in Space – Moment of Force -principle of moments – Coplanar Applications – Couples -Resultant of any Force System.

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

UNIT – III
FRICTION: Introduction – Theory of Friction – Angle of friction - Laws of Friction – Static and Dynamic Frictions –Motion of Bodies: Wedge, Screw, Screw-jack and Differential Screw-jack.
Transmission of Power: Flat Belt Drives - Types of Flat Belt Drives – Length of Belt, tensions, Tight side, Slack Side, Initial and Centrifugal – Power Transmitted and Condition for Max. Power.

UNIT – IV
CENTROIDS AND CENTERS OF GRAVITY: Introduction – Centroids and Centre of gravity of simple figures (from basic principles) – Centroids of Composite Figures - Theorem of Pappus – Center of gravity of bodies and centroids of volumes.

UNIT – V
Moments of Inertia : Definition – Polar Moment of Inertia –Radius of gyration - Transfer formula for moment of inertia - Moments of Inertia for Composite areas - Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia : Moment of Inertia of Masses- Transfer Formula for Mass Moments of Inertia - mass moment of inertia of composite bodies.

TEXT BOOKS:
1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International   Publishers
2. Engineering Mechanics - Statics and Dynamics by Ferdinand.L. Singer / Harper International Edition.
3. Engineering Mechanics/ S. Timoshenko and D.H. Young / Mc Graw Hill Book Company.

REFERENCES:
1. Engineering Mechanics / Irving Shames / Prentice Hall
2. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
3. Engineering Mechanics, Umesh Regl / Tayal.
4. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

COURSE OUTCOMES:

The students will be able to
1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A91502) COMPUTER PROGRAMMING & DATA STRUCTURES

I Year I-Sem: Civil & Mech   L/T/P   C
                                                        4/1/0   4

Objectives:

To provide the necessary knowledge and training for step by step computer program development and to present the basic concepts in C programming language and to prepare the students to write modular and readable C Programs. Also the Course introduces the foundation concepts like abstract data types, linear data structures, to analyze the performance of algorithms and how to use stacks, queues, searching and sorting and aims to train the students to write working programs to solve problems using data structures such as arrays, linked lists etc.

Syllabus Content

UNIT-1

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to C Language: Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

Selection Statements: if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.

UNIT-2

Designing Structured Programs: Functions, basics, user defined functions, inter function communication,

Standard functions: Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

Arrays: Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT-3

Pointers: Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

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

UNIT-4

Derived types: Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

Input and Output: Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT-5

Sorting: Selection sort, Bubble sort, Insertion sort,

Searching: Linear and Binary search methods.

Data Structures: Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

Text Books:
1. *C Programming & Data Structures*, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
3. *Problem Solving and Program Design in C*, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.

References:
1. *C& Data structures* – P. Padmanabham, Third Edition, B.S. Publications.
2. *C& Data structures* – E V Prasad and N B Venkateswarlu, S.Chand&Co.
3. *C Programming & Data Structures*,E.Balagurusamy,TMH.
4. *C Programming with problem solving*, J.A. Jones & K. Harrow, dreamtech Press
5. *Programming in C* – Stephen G. Kochan, III Edition, Pearson Eductaion.
6. *C for Engineers and Scientists*, H.Cheng, Mc.Graw-Hill International Edition
7. *Data Structures using C* – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
8. *The C Programming Language*, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

Course Outcomes:

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:
1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.
4. Designing of linear data structures stacks, queues and linked lists. Learning of different searching and sorting techniques and ability to compare differences in performances.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ENGLISH LANGUAGE COMMUNICATIONS SKILLS LAB

I Year I-Sem: MECH. & EEE (A91005)   **L T P C**
    II-Sem: CIVIL, CSE & ECE (A92007)   **0 0 3 2**

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

Objectives:
- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes:
- Better Understanding of nuances of language through audio- visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students

Syllabus:
English Language Communication Skills Lab shall have two parts:
a. **Computer Assisted Language Learning (CALL) Lab**
b. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the **English Language Communication Skills Lab**
Exercise – I
CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking Activity and JAM Sessions
Intensive Practice in Articles, Prepositions, Word Formation- Prefixes & Suffixes, Synonyms & Antonyms with Software/Handouts

Exercise – II
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Concord (Subject in agreement with verb) and Words Often Misspelt- Confused/Misused

Exercise - III
CALL Lab: Minimal Pairs- Word Accent and Stress Shifts- Listening Comprehension.
ICS Lab: Descriptions- Narrations- Giving Directions and Guidelines.
Sequence of Tenses, Question Tags and One Word Substitutes.

Exercise – IV
CALL Lab: Intonation and Common Errors in Pronunciation.
ICS Lab: Extempore- Public Speaking
Active and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise – V
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Information Transfer- Oral Presentation Skills
Reading Comprehension and Job Application with Resume Preparation.

Minimum Requirement of Infrastructural Facilities for ELCS Lab:
1. Computer Assisted Language Learning (CALL) Lab:
The Computer Aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware Component):
Computer network with LAN with minimum 60 multimedia systems with the following specifications:
- i) P – IV Processor
  - a) Speed – 2.8 GHZ
  - b) RAM – 512 MB Minimum
  - c) Hard Disk – 80 GB
- ii) Headphones of High Quality

2. Interactive Communication Skills (ICS) Lab :
The Interactive Communication Skills Lab: A spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system, camcorder etc.
Prescribed Lab Manual: A Manual entitled "*English Language Communication Skills (ELCS) Lab Manual- cum- Work Book*", published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.
- *In addition to the prescribed lab manual, all the listening and speaking activities mentioned in Text-1 and Text-2 can be conducted in the English Language Communication Skills Lab.*

Suggested Software:
- Macmilan Dictionary Modern English (with CD).
- Oxford Advanced Learners' Dictionary (with CD).
- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley
- Punctuation Made Easy by Darling Kindersley
- Clarity Pronunciation Power – Part I
- Clarity Pronunciation Power – part II
- **Oxford Advanced Learner's Compass, 8th Edition**

- *DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.*
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge**
- **English Pronunciation in Use** (Elementary, Intermediate, Advanced) Cambridge University Press
- Raman, M & Sharma, S. 2011. Technical Communication, OUP
- Sanjay Kumar & Pushp Lata. 2011. Communication Skills, OUP

SUGGESTED READING:

1. Situational Enlgish, Prof. Damodar 33 situations BIE Publications (with CD)
2. Radio lessons, Prof. G. Damodar.
3. Rama Krishna Rao, A. *et al. English Language Communication Skills – A Reader cum Lab Manual Course Content and Practice.* Chennai: Anuradha Publishers
4. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories.* New Delhi: Foundation
5. *Speaking English Effectively* 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
6. Sasi Kumar, V & Dhamija, P.V. *How to Prepare for Group Discussion and Interviews.* Tata McGraw Hill
7. Hancock, M. 2009. *English Pronunciation in Use. Intermediate.* Cambridge: CUP
8. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
9. Hewings, M. 2009. *English Pronunciation in Use. Advanced.* Cambridge: CUP
10. Marks, J. 2009. *English Pronunciation in Use. Elementary.* Cambridge: CUP
11. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication.* New Delhi : Foundation
12. Soundararaj, Francis. 2012. *Basics of Communication in English. New Delhi: Macmillan*
13. *Spoken English* (CIEFL) in 3 volumes with 6 cassettes, OUP.
14. *English Pronouncing Dictionary* Daniel Jones Current Edition with CD.
15. *A Textbook of English Phonetics for Indian Students* by T.Balasubramanian (Macmillan)
16. *Topical Thoughts – (A Textbook of Reading and Writing Skills) Dr.P. Satyanarayana, Vaagdevi College of Engineering, Warangal Publications, 2013.*

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A91007) ENGINEERING CHEMISTRY LAB

I Year I-Sem: CIVIL & MECH   **L T P C**
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Objectives

1. To impart fundamental knowledge in handling the equipment/glassware and chemicals in the chemistry laboratory.
2. To offer hands on experience on the basic equipment related to engineering chemistry.
3. For practical understanding of the theoretical concepts of chemistry.

Titrimetry:

1. Estimation of ferrous iron by dichrometry.
2. Estimation of hardness of water by EDTA method.

Instrumental methods:

Colorimetry

3. Determination of ferrous iron by colorimetric method
4. Estimation of copper by colorimetry.

Conductometry:

5. Determination of strength of given strong Acid using strong base by Conductometric method
6. Determination of strength of given strong Acid and weak acid present in given mixture of acids using strong base by Conductometric method

Potentiometry:

7. Determination of strength of given strong Acid using strong base by Potentiometric method
8. Determination of strength of given weak Acid using strong base by Potentiometric method

Physical properties:

9. Measurement of Viscosity of liquids
10. Measurement of Surface Tension of liquids

Chemical Kinetics:

11. Determination of rate constant of hydrolysis of methyl acetate catalyzed by an acid.

Preparations:

12. Preparation of Aspirin tablet.

Laboratory Manual: 1. Engineering Chemistry Lab manual by Mukkanti, BS Publications.
                     2. Engineering Chemistry Lab manual by Bharathi Kumari, VGS Publications

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A91504) COMPUTER PROGRAMMING & DATA STRUCTURES LAB

I Year I-Sem: Civil & Mech.
L/T/P   C
0/0/3   2

Objectives:

To provide the necessary knowledge and practical training for step by step computer program development and to apply the basic concepts in C programming language and to train the students to write modular and readable C Programs. Also the Lab Course makes use of foundation concepts like abstract data types, linear data structures, to analyze the performance of algorithms and uses stacks, queues, searching and sorting and trains the students to write working programs to solve problems using data structures.

Syllabus Content

1.a   Write a C program to find the sum of individual digits of a positive integer.

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

1.c   Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

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

2.b   Write a C program to find the factorial of a given integer.

2.c   Write a C program to find the GCD (greatest common divisor) of two given integers.

3.a   Write a C program to solve Towers of Hanoi problem.

3.b   Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

3.c   Write a C program to find both the largest and smallest number in a list of integers.

4.   Write a C program that uses functions to perform all of the following:

     i.   Reading of a matrix.

     ii.   Printing a matrix in a formatted form.

     iii.   Adding two compatible matrices to produce a result matrix

     iv.   Multiplying two compatible matrices to produce a result matrix.

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

     i.   To insert a sub-string in to a given main string from a given position.

     ii.   To delete n Characters from a given position in a given string.

     iii.   Write a C program to determine if the given string is a palindrome or not.

6.a   Write a C program using pointer to create a two dimensional matrix, to input values in to the matrix and to display the matrix and its transpose. Free the memory properly.

6.b   Write a C program to demonstrate calling of a function (like add,subtract,multiply) using a function pointer.

7.a   Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.

7.b   Write a C program to count the lines, words and characters in a given text.

8.a   Write a C program to generate Pascal's triangle.

8.b   Write a C program to construct a pyramid of numbers.

9.   Write a menu driven C program that uses functions to perform the following operations on complex numbers stored in a structure:

   i.   Reading a complex number

   ii.   Writing a complex number

   iii.   Addition of two complex numbers

   iv.   Multiplication of two complex numbers

10.a Write a C program which copies one text file to another text file and verify the correctness.

10.b Write a C program which copies one binary file to another binary file and verify the correctness.

10.c Write a command-line C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)

11.a Write a C program to display the contents of a file.

11.b Write a C program to produce reverse of the content of a text fie into another text file and verify the result.

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

12.   Write a C program that uses functions to perform the following operations on singly linked list.:

   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

13. Write C programs that implement stack (its operations) using

   i) Arrays ii) Pointers

14. Write C programs that implement Queue (its operations) using

   i) Arrays ii) Pointers

15.   Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

   i) Bubble sort   ii) Selection sort

16. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

    i) Linear search   ii) Binary search

Text Books:
1. *C Programming & Data Structures*, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
3. *Problem Solving and Program Design in C*, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.

References:
1. *C& Data structures* – P. Padmanabham, Third Edition, B.S. Publications.
2. *C& Data structures* – E V Prasad and N B Venkateswarlu, S.Chand&Co.
3. *C Programming & Data Structures*,E.Balagurusamy,TMH.
4. *C Programming with problem solving*, J.A. Jones & K. Harrow, dreamtech Press
5. *Programming in C* – Stephen G. Kochan, III Edition, Pearson Eductaion.
6. *C for Engineers and Scientists*, H.Cheng, Mc.Graw-Hill International Edition
7. *Data Structures using C* – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
8. *The C Programming Language*, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

Course Outcomes:

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:
1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.
4. Designing of linear data structures stacks, queues and linked lists. Learning of different searching and sorting techniques and ability to compare differences in performances.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A92001) MATHEMATICS – II
(Common for all Branches)

I Year II-Sem

L T P C
4 1 0 4

Course Objective:

The main aim of this subject is to improve the mathematical knowledge of the student. When the student study the mathematics-II he should get the impression that mathematics is a systematic science of practical importance, resting on a relatively small number of basic concepts and involving powerful unifying methods. He should soon convince himself of the necessity for applying mathematical procedures to engineering problem.

By studying the mathematics the students translating the given physical information into mathematical model. This model may be a differential equation, a system of equation or some other mathematical expression.

Unit-I :

Solution of Linear System:

Matrix and types of matrices Elementary row and column operations on a matrix, Rank of matrix –Echelon and Normal form – Inverse of a matrix using elementary operations, linear dependence and independence of vectors, solutions of systems of linear equations using elementary operations, and direct methods-Gauss elimination, LU-decomposition.

Unit-II:

Eigen values and Eigen vectors:

Eigen values and Eigen vectors of a matrix and their properties, Cayley-Hamillton theorem and its applications, Diagonalization of a matrix, Quadratic forms - Reduction of a quadratic form to canonical form by linear transformation and orthogonal transformation and nature, signature index of a quadratic form, Complex matrices-Hermitian, skew-hermitian and Unitary matrices.

Unit – III:

Fourier series:
Determination of Fourier Coefficients, Even and Odd functions, Half Range Fourier sine and cosine expansions Fourier series in an arbitrary interval.

Fourier transforms: Fourier integrals, Fourier sine and cosine integrals. Fourier transforms Fourier sine and cosine transforms- Properties- Inverse transforms- Finite Fourier transforms

Unit - IV:

Vector Calculus:
Scalar and Vector fields; Vector Differentiation, Level surfaces -
directional derivative - Gradient of scalar field, Divergence and Curl of a vector field -
Laplacian - Line and surface integrals; Green's theorem, Gauss Divergence theorem, Stoke's
theorem (without proof).

Unit – V:

Partial differential equation:
Formation of partial differential Equation by elimination of arbitrary constants and arbitrary
functions, solutions of first order linear and
non-linear Equations. Method of separation of variables, for 2nd order Equations.
Applications of partial differential Equations.

Recommended Text Books:

1. R.K.Jain and S.R.K.Iyengar : Advanced Engineering Mathematics,
   Narosa Publishing House, 2008
2. B. S. Grewal : Higher Engineering Mathematics, Khanna Publications, 2009.

Reference Book:

1. T.K.V.Iyengar:Mathematical Methods, S.Chand and Company.
2. Erwyn Kreyszig : Advanced Engineering Mathematics, John Wiley and Sons, 8th
   Edition.
3. A textbook of Engineering Mathematics Vol-I by P.B.Bhaskara Rao, S.K.V.S. Rama
   Chary
4. A textbook of Engineering Mathematics Vol-I by C. Shankaraiah, VGS Book Link

Course Outcomes:

By studying Mathematics-II students are able to find the rank of matrix and they can
find eigen values & eigen vectors of different engineering fields. They use concept of
matrices in the development of programming languages and by studying the fourier series &
fourier transforms students are able to solve the problems related to theory of circuits and
many applications in electronic engineering and communications engineering.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A92002) ENGINEERING PHYSICS

I Year II-Sem: CIVIL & MECH.

L	T	P	C
4	1	0	4

OBJECTIVES:

- Physics is the mother of engineering and technology. Without the applications of concepts of physics there can be no technological developments. Hence physics is the foundation on which stands the elaborate structure of technology. The main purpose of teaching physics to engineering under graduates is to acquaint the budding engineers with a thread of development. The aim of Physics is to provide an adequate exposure and develop insight about the basic principles of physics along with the engineering applications. The acquaintance of basic physics principles would help the engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.

UNIT-I:

CRYSTALLOGRAPHY, CRYSTAL STRUCTURES & BAND THEORY OF SOLIDS:

Crystallography & Crystal Structures: Space lattice, Unit cell, Lattice parameters, Crystal systems, Bravais lattice, Crystal planes& crystal directions, Miller indices, Inter-planar spacing of orthogonal crystal systems. Atomic radius, Co-ordination number and packing fraction of S.C.C., B.C.C & F.C.C., Crystal structures of diamond & NaCl.
Band theory of solids: Schroedinger time independent wave equation and significance of wave function. Electrons in a periodic potential, Bloch theorem, Kronig-Penny model (Qualitative treatment), E-k curve, Concept of effective mass of electron and hole. Origin of band formation in solids, Classification of materials into conductors, semi conductors and insulators.

UNIT-II:

SEMI-CONDUCTOR PHYSICS & SEMI-CONDUCTOR DEVICES.
Semi-conductor Physics: Introduction, Calculation of carrier concentration in intrinsic semiconductors and extrinsic semi conductors (N-type), Direct and Indirect band gap semi conductors, Hall effect & its applications.
Semi-conductor devices: Energy diagram of P-N diode, Diode equation, I-V characteristics of P-N junction diode, LED, LCD, Photo diode & Solar cell.

UNIT-III:

DIELECTRICS & MAGNETIC MATERIALS
Dielectrics: Introduction, Electric dipoles, Dipole moment, Dielectric constant, Polarizability, Electric susceptibility, Displacement vector, Electronic, Ionic and Orientational polarizations and calculations of electronic and ionic polarizabilities , Internal

fields in solids, Clausius - Mosotti equation, Piezo-electricity, Ferro electricity, Pyro electricity.

Magnetics: Origin of magnetic moment, Bohr magneton, Classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Domain theory of ferro magnetism on the basis of hysteresis curve, Soft and hard magnetic materials , Properties of anti-ferro and ferri magnetic materials and their applications.

UNIT-IV:

LASERS & FIBRE OPTICS

Lasers: Characteristics of lasers, Spontaneous and stimulated emission of radiation, Einstein's coefficients and relation between them (qualitative treatment), Population inversion, Lasing action, Ruby laser. Semi conductor diode laser, Applications of lasers in engineering and medicine.

Fibre Optics: Acceptance angle and acceptance cone, Numerical aperture, Step index and graded index fibres, Attenuation in optical fibres, Applications of optical fibres in communication systems.

UNIT-V:

SUPER-CONDUCTIVITY & NANO SCIENCE

Super-conductivity: Introduction, Zero resistance, Critical temperature, Perfect dia magnetism, Meissner effect, Critical field (H_c), Type-I & Type -II super conductors, Applications of super conducting magnets.

Nano Science: Nano scale, Surface to volume ratio, Quantum confinement, Top-down method: Bottom-up fabrication, sol-gel method, chemical vapour deposition method, Characterization by XRD (Braggs Law) and SEM (Principles) applications.

RECOMMENDED TEXT BOOKS:

1. Engineering Physics, P.K Palanisamy, Scitech Publications
2. Engineering Physics, V. Rajandran, Tat Mc. Graw Hill Book Publishers.
3. A Text Book of Engg Physics – M. N. Avadhanulu & P. G. Khsirsagar, S. Chand & Co. (for acoustics).
4. Applied Physics for Engineers – P. Madhusudana Rao, Academic Publishing Company, 2013.

REFERENCE BOOKS:

1. Solid State Physics – M.Armugam, Anuradha Publications.
2. Modern Physics – R. Murugeshan & K. Siva Prasath, S. Chand & Co. (for Statistical Mechnaics).
3. Introduction to Solid State Physics, C. Kittel (Wiley Eastern).
4. Solid State Physics, A.J. Dekker (Macmillan).
5. Applied Physics, Mani Naidu Pearson Edition.

Learning Outcomes:

1. The students will come to know about the various crystal structures and also about their mechanical and electrical properties.
2. The student will learn about the different semi-conduction devices along with the necessary basic theory.
3. The students will learn about various magnetic materials and dielectric materials which find many industrial applications.
4. The students learn about different types of emission of radiation and advanced applications of lasers in different fields.
5. They learn about different types of optical fibres and their applications in different fields.
6. The students will learn about the various methods of fabrication of nano materials and different methods of their characterization.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A92006) HUMAN VALUES AND PROFESSIONAL ETHICS

I Year II-Sem: Civil, EEE & Mech   **L T P C**
                                                          2 0 0 2

Unit-1: Human Values: Morals, values, ethics – integrity – work ethics –service learning – civic virtue – respect for others- living peacefully - Caring –sharing –honesty – courage – valuing time – cooperation – commitment –empathy – self-confidence –spirituality – character- Mini-Cases

Unit-II: Professional Ethics: Profession- and professionalism   - Two models of professionalism –Professional etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards –Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct (as given by ASME, ASCE, IEEE, IETE, Institute of Engineers as Guidelines for ethical conduct). Mini-cases.

Unit-III: Professional Responsibilities: Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards and Risks- Risk benefit analysis– congeniality, collegiality and loyalty. Respect for authority – conflicts of interest – occupational crime –– Mini-Cases.

Unit-IV: Professional Rights: professional rights and employee rights communicating risk and public policy – Whistle blowing - collective bargaining. Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Regulatory compliances, Monitoring and control- Mini-Cases

Unit-V: Ethics in global context: Global issues in MNCs- Problems of bribery, extortion, and grease payments – Problem of nepotism, excessive gifts – paternalism – different business practices – negotiating taxes. Mini-Cases.

Mini-projects

Project 1: The student of this course should invariably attend (or watch on internet/any TV channel/youtube/social media) two speeches of 30 minutes duration each dealing with spiritual discourse and submit a report on the contents of the lecture proceedings.

Project 2: Visit any organization (including shops/ hotels or shopping malls in your region) of your choice and observe how the professionals perform the given job with a focus on professional ethics and human values.

References

1. Aryasri, *Human Values and Professional Ethics*, Maruthi Publications.
2. S B George, *Human Values and Professional Ethics,* Vikas Publishing.
3. KR Govindan & Saenthil Kumar:Professional *Ethics and Human Values*, Anuradha Publications.
4. S K Chakraborthy & D.Chakraborthy: *Human Values and Ethics*, Himalaya.
5. M. Govindarajan, S. Natarajan, & V.S. Senthilkumar: *Engineering Ethics(Includes Human Values),* HI Learning Pvt. Ltd., New Delhi – 110001

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A92203) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

I Year II-Sem: CIVIL, MECH & CSE

	L	T/P/D	C
	4	1/-/-	4

Course Objective

This course introduces the concepts of basis electrical engineering parameters, quantities, analysis of AC and DC circuits, the construction operation and analysis of transformers, DC and AC machines. It also gives knowledge about operation of diode and 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.

Three Phase AC Circuits: Production of 3 -ϕ Voltages, Voltage & Current relationships of Line and Phase values for Star and Delta connections.

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 (elementary treatment only)
3-Phase Induction Motor: Constructional features, Principle of Operation (elementary treatment only)

UNIT- IV

P-N Junction Diode - Diode equation, Energy Band diagram, V-I characteristic, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit.

Rectifiers and Filters - The P-N junction as a rectifier - A Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier, Filters – Inductor Filters, Capacitor Filters, L-section Filters, π- section Filters.

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.(elementary treatment 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.

Course Outcomes:
   After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, and operation of the transformers in the energy conversion process, electromechanical energy conversion, construction operation characteristics of DC machines and the constructional features and also fundamental and characteristics of diode and transistor. With which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ENGINEERING GRAPHICS

I Year I-Sem EEE, ECE, CSE (A91301)   **L   T   P   C**
**   II- Sem Civil, Mech   (A92301)**   **2   0   4   4**

COURSE OBJECTIVES:
1. Use various engineering drawing instruments.
2. Learn the basic conventions of drawings, dimensioning, scales and conic sections like ellipse, parabola and hyperbola.
3. Learn projections of points, lines viewed in different positions
4. Learn projections of plane surfaces and solids viewed in different positions.
5. Gain knowledge of sections of solids and their usage in real time applications.
6. Attain the concepts of isometric, orthographic projections.

UNIT – I
INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Drawing and their significance- Drawing Instruments and their use. Principle of Dimensioning. Geometrical Constructions of regular polygons.
Conic Sections: Ellipse, Parabola & Hyperbola (General Method only).
Cycloidal Curves: Cycloid, epi-cycloid & hypo-cycloid.
Involutes: Circle, square, pentagon & hexagon**.**
Scales: Plain scale, Diagonal scale & Vernier scale.

UNIT – II
ORTHOGRAPHIC PROJECTIONS IN FIRST ANGLE PROJECTION: Principles of Orthographic Projections – Conventions – First and Third Angle projections.
PROJECTIONS OF PLANES : Surface inclined to both the Principal Planes.
PROJECTIONS OF RIGHT REGULAR SOLIDS: Axis inclined to both the Principal planes.

UNIT – III
SECTIONS AND SECTIONAL VIEWS: Right Regular Solids – Prism, Cylinder, Pyramid, Cone & Auxiliary views.
DEVELOPMENT OF SURFACES: Right Regular Solids – Prism, Cylinder, Pyramid, Cone and their parts.

UNIT – IV
ISOMETRIC PROJECTIONS : Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.
TRANSFORMATION OF PROJECTIONS : Conversion of Isometric Views to Orthographic Views& Vice versa.

UNIT – V
Introduction to Computer aided Drafting and generation of simple figures by using circle, line, Rectangle & Arc, etc.,

TEXT BOOKS
1. Engineering Drawing, N.D. Bhatt
2. Engineering Drawing – Basant, Agrawal, TMH

REFERENCES :
1. Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd.
2. Engineering drawing – P.J. Shah .S.Chand Publishers.
3. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.
4. Engineering Drawing – M.B. Shah and B.C. Rana, Pearson.
5. Engineering Drawing by K.Venu Gopal& V.Prabu Raja New Age Publications.
6. Engineering Drawing By John. PHI Learning Publisher.

COURSE OUTCOMES:
The students will be able to
1. Understand and draw the different types of conic sections.
2. Analyze the projections of points, straight lines, plane surfaces, solids at different positions and angles.
3. Convert orthographic views into isometric views and vice versa.
4. Perform sections of solids, development of surfaces and their applications in human life.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A92302) ENGINEERING MECHANICS-II

I Year II-Sem: Civil & Mech

L T P C
4 1 0 4

COURSE OBJECTIVES:
1. Determine the internal forces in plane trusses.
2. Know the applications of trusses to cantilever and simply supported trusses.
3. Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of references.
4. Apply work, energy, relationships for a particle in motion.
5. Apply impulse and momentum relationships for a particle in motion.
6. Describe the motion of a rigid body in different frames of reference.

UNIT-I
ANALYSIS OF PERFECT FRAMES: Analytical Method-Types of frames-Assumption for forces in members of a perfect frame. Method of Joints, Method of sections, Force Table, Cantilever Trusses, Structure with one end hinged & other freely supported on rollers carrying Horizontal & inclined loads.

UNIT-II
KINEMATICS OF A PARTICLE: Motion of a particle – Rectilinear motion – motion curves – Rectangular components of curvilinear motion– Kinematics of Rigid Body - Types of rigid body motion -Angular motion - Fixed Axis Rotation .

UNIT-III
KINETICS OF A PARTICLES: Translation -Analysis as a Particle and Analysis as a Rigid Body in Translation – Equations of plane motion - Angular motion - Fixed Axis Rotation – Rolling Bodies.

UNIT-IV
WORK – ENERGY METHOD: Work energy Equations for Translation - Work-Energy Applications to Particle Motion – Work energy applied to Connected Systems - Work energy applied to Fixed Axis Rotation and Plane Motion. Impulse and momentum.

UNIT-V
Mechanical Vibrations : Definitions and Concepts – Simple Harmonic Motion – Free vibrations, simple and Compound Pendulums – Torsion Pendulum – Free vibrations without damping: General cases.

TEXT BOOKS:

1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International   Publishers
2. Engineering Mechanics - Statics and Dynamics by Ferdinand.L. Singer / Harper International Edition.
2. Engineering Mechanics/ S. Timoshenko and D.H. Young / Mc Graw Hill Book Company.

REFERENCES:

1. Engineering Mechanics / Irving Shames / Prentice Hall
2. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
3. Engineering Mechanics, Umesh Regl / Tayal.
4. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

COURSE OUTCOMES:

The students will be able to
1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ENGINEERING WORKSHOP

I Year I-Sem: Civil, EEE & ECE (A91303)   **L T P C**
II-Sem: CSE & Mech (A92303)   **0 0 3 2**

COURSE OBJECTIVES:
1. Know the usage of various tools and their application in carpentry, tin smithy.
2. Know the usage of various tools and their application in black smithy, foundry, welding and house wiring.
3. Make lap joint and dove tail joint in carpentry.
4. Make scoop, funnel and tray like items in tin smithy.
5. Use one-way, two-way switches, parallel and series connections in house wiring.
6. Know the basics of welding.

I.   TRADES FOR EXERCISES :
(Any **six** trades from the following for Mechanical Engineering Branch & Any four trades for all other Branches with minimum of **two** exercises in each trade)

1.   Carpentry
2.   Fitting
3.   Tin-Smithy
4.   Black Smithy
5.   House-wiring
6.   Foundry
7.   Plumbing

**II.   ** Trades for Demonstration & Exposure

1.   Demonstration of power tools & wiring
2.   Welding
3.   Machine Shop

III.   IT Workshop I: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises.

IT Workshop II: Installation of operating system windows and linux simple diagnostic exercises.

TEXTBOOKS:
1.Workshop Manual – P.Kannaiah / K.L.Narayana / Scitech Publishers.

2. Workshop Manual- Venkat Reddy /BS Publications / 6th Edition.

COURSE OUTCOMES:

The students will be able to

1. Know the fundamental knowledge of various trades and their usage in real time applications
2. Gain knowledge of Foundry, Welding, Black smithy, Fitting, Machine shop and house wiring
3. Understand the basis for analyzing power tools in construction and wood working, electrical engineering and mechanical engineering.
4. Use basic concepts of computer hardware for assembly and disassembly.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A92008) ENGINEERING PHYSICS LAB

I Year II-Sem: CIVIL & MECH.   **L   T   P   C**
                                              0   0   3   2

Objectives:

The purpose of doing the experiments in laboratory is not simply to verify a principle but also to explore the other related phenomena and to find their applicability. The students are suggested to work in this direction and get benefit out of it.

1. To get practical knowledge which is related to the engineering course in the development of new technologies.

2. To impart fundamental knowledge in handling the equipment in Physics laboratory.

3. To offer practical experience on the basic equipment related to engineering Physics.

4. For practical understanding of the theoretical concepts of Physics.

5. To develop inquisitiveness in handling physics equipment leading to new technologies.

S. No.   Name of the Experiment

1. Study of LED and LASER diode characteristics.

2. Torsional Pendulum-determination of rigidity modulus of material of a wire.

3. Determination of energy gap of material of p-n junction.

4. Bending losses of optical fibres and evaluation of numerical aperture of a given optical fibre.

5. Study of Decay of charge & determination of time constant of an RC circuit.

6. Determination of resonant frequency and quality factor of LCR circuit.

7. Study of Characteristics of solar cell.

8. Determination of wavelength of Laser source – Diffraction grating.

9. Determination of frequency of AC supply-sonometer.

10. Determination of wavelength of monochromatic source using diffraction grating.

Laboratory Manual:

The Laboratory manual of Engineering Physics by Dr. Y. Aparna & Dr. K. Venkateshwar Rao, VGS Publications.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A92205) BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

Class: I Year B.Tech II Semester.　　　　　Practicals: 3
Branch: Civil/Mech/CSE　　　　　　　　　Tutorials: 0
Duration of University Examination: 3 Hrs　　University Examination: 50 Marks
　　　　　　　　　　　　　　　　　　　　　Sessionals: 25 Marks

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)

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93002) PROBABILITY & STATISTICS

II Year B.Tech. Civil Engg. I-Sem

L T P C
4 1 0 4

Course Objective:
The main purpose of teaching Probability and Statistics is to develop the knowledge of the student. In the syllabus we concentrate on a few carefully selected basic ideas of general practical importance which are especially suitable for teaching the students probability and statistics to think and develop his own creative ability to solve engineering problem.

UNIT-I: Probability
Sample space and events – Probabilty – The axioms of probability – Some Elementary theorems – Conditional probability – Baye,s theorem, Random variables – Discrete and continuous**.**

UNIT-II: Single Random variables and probability distributions.
Random variables – Discrete and continuous, Probability distributions, mass function/ density function of a probability distribution. Mathematical Expectation, Moment about origin, Central moments, Moment generating function of probability distribution.
Binomial, Poisson & normal distributions and their properties.

UNIT-III: Correlation & Regression
 Covariance of two random variables, Correlation -Coefficient of correlation, The rank correlation. Regression- Regression Coefficient, The lines of regression and multiple correlation & regression.

UNIT-IV: Sampling Distributions and Testing of Hypothesis
Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and varience, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of varience.
Parameter estimations – likelihood estimate, interval estimations .
Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, Level of significance. One sided test, Two sided test,
Large sample tests:
  (i)   Test of Equality of means of two samples equality of sample mean and population mean (cases of known varience & unknown varience, equal and unequal variances)
  (ii) Tests of significance of difference between sample S.D and population S.D.
  (iii) Tests of significance difference between sample proportion and population proportion&difference between two sample proportions.
Small sample tests:
Student t-distribution,its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples
Snedecor's F- distribution and it's properties. Test of equality of two population variences
Chi-square distribution , it's properties, Chi-square test of goodness of fit

UNIT- V: Queuing Theory :

Queuing Theory: Notation and Assumption, Queuing Models With Poisson 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) Fundamentals of Mathematical Statistics by S C Gupta and V.K.Kapoor (Chapters IV&V)
2) Probability and Statistics for Engineers and Scientists by SHELDON M.Ross, Academic Press
3) Probability and Statistics for Engineering and the Sciences by Jay L. Devore.

References:
1) Mathematics for Engineers Series–Probability Statistics and Stochastic Process by K.B.Datta and M.A S.Srinivas, Cengage Publications.
2) Probability, Statistics and Stochastic Process by Prof. A R K Prasad., Wiely India
3) Probability and Statistics by T.K.V.Iyengar &B.Krishna Gandhi
4) A Text Book of Probability and Statistics, Shahnaz Bathul, Cengage Learning

Course Outcomes:
By studying the Probability & Statistics students are able to describes randomness or an uncertainty in certain realistic situations it can be of either discrete or continuous functions and the study of binomial, and the Poisson and normal random variables for the continuous case predominantly describe important probability distributions. Important statistical properties for this random variables provide very good insight and essential for Industrial applications. By studying the queuing theory students are able to solve the real world problems of queuing systems.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93003) ENVIRONMENTAL STUDIES

II Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	0	0	4

Course Objectives:

Student will be able to
- Develop an understanding of the necessity of protection of environment
- Develop an understanding of Natural resources
- Develop an understanding of Biodiversity
- Develop an understanding of Global Environmental problems
- Develop an understanding of Environmental pollution

UNIT - I

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

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - II

ECOSYSTEMS: Concept of an ecosystem.-Structure and function of an ecosystem.-Producers, consumers and decomposers.-Energy flow in the ecosystem-Ecological succession-Food chains, food webs and ecological pyramids.-Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - III

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

UNIT - IV
ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of:
a. Air pollution, b. Water pollution, c. Soil pollution, d. Marine pollution,
e. Noise pollution, f. Thermal pollution, g. Nuclear hazards
SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT - V
SOCIAL ISSUES AND THE ENVIRONMENT : From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its
problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. –Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act - Issues involved in enforcement of environmental legislation. -Public awareness.
HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies.

TEXT BOOK:
1   Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.,UniversitiesPress
2   Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE:
1. Environmental Studies by Benny Joseph, McGraw Hill Education (India) Private Limited.
2. Introduction to Environmental Engineering and Science (3rd Edition) by Gilbert M. Masters, Wendell P. Ela, PHI

Course Outcomes:
    After completion of this course, student should be able to:
        •   Acquire the knowledge on environment
        •   Acquire the knowledge of various Natural Resources
        •   Develop skills in understanding of various environmental problems
        •   Develop skills to protect the Environment

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93301) METALLURGY AND MATERIAL SCIENCE

II Year B.Tech. Mech. Engg. I-Sem　　　　　　　　　　　**L　T　P　C**
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COURSE OBJECTIVES:
1. Understand the bond formation, grains and grain boundaries in crystals.
2. Develop new materials using equilibrium diagram and lever rule applicable in calculating the liquid and solid percentage.
3. Apply heat treatment process to different materials to get required properties.
4. Gain knowledge about advanced materials like composites, ceramics.
5. Know the selection of heat treatment process for different materials.
6. Know the properties & applications of cast iron & steels.

UNIT-I:
Structure of Metals : Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.
Constitution of Alloys : Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT-II:
Equilibrium Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni, Al-Cu, Bi-Cd, Cu-Au, Cu-Sn and Fe-Fe$_3$C.

UNIT-III:
Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT-IV:
Heat treatment of Alloys: Effect of alloying elements on Fe-Fe$_3$C system, Annealing, Normalizing, Hardening, TTT diagrams, tempering, Hardeneability, surface hardening methods, Age hardening treatment, Cryogenic treatment of alloys.
Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys.

UNIT-V:

Ceramic materials: Crystalline ceramics, glasses, cermets, abrasive materials, nonmaterial's – definition, properties and applications of the above.

Composite materials: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C – C composites.

COURSE OUTCOMES:

The students will be able to

1. Understand the bond formation, grains and grain boundaries in crystals.
2. Develop new materials using equilibrium diagram and lever rule   applicable in calculating the liquid and solid percentage.
3. Apply heat treatment process to different materials to get required properties.
4. Gain knowledge about advanced materials like composites & ceramics.

TEXT BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avener.
2. Material science & Metallurgy / Kodgire

REFERENCE BOOKS:

1. Science of Engineering Materials / Agarwal
2. Materials Science / Vijendra Singh
3. Elements of Material science / V. Rahghavan
4. An introduction to material science / W.G.Vinas & H.L. Mancini
5. Material Science & Material / C.D.Yesudian & Harris Samuel
6. Engineering Materials and their Applications – R. A Flinn and P K Trojan / Jaico Books.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93302) MECHANICS OF SOLIDS

II Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
1. Gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures.
2. Learn shear force & bending moment concept for different beams under different loads.
3. Learn bending stress & shear stress concept for different beams under different loads.
4. Learn the concept of deflection & slope of the different beams.
5. Learn the concept of stresses in thin & thick cylinders.

UNIT-I
SIMPLE STRESSES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and 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 , UDL, gradually varying loads and combination of these loads – Point of contraflexure – 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 of 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 beam sections like rectangular, circular, triangular, I, T & angle sections.

UNIT-IV
TORSION OF CIRCULAR SHAFTS: Theory of Pure Torsion- Derivation of Torsion equations: $T/J=q/r=N\theta/L$- Assumptions made in the theory of pure torsion- Torsional Moment of resistance – Polar Section modulus- Power transmitted by shafts- Combined bending & 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 strain – changes in diameter, length and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

Thick Cylinders – lame's equation – cylinders subjected to inside and outside pressures – compound cylinders.

UNIT-V

DEFLECTION OF BEAMS : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. gradually varying load. Mohr's theorems – Moment Area method – application to simple cases including overhanging beams.

COURSE OUTCOMES:

The students will be able to
1. Understand the concepts of stress and strain in mechanics of solids and material properties.
2. Apply the fundamental concepts of shear force & bending moment for Cantilever Beam, simply supported beam & overhanging beam with point loads, UDL, gradually varying loads & their combination.
3. Apply the fundamental concepts of Bending stresses & shear stresses for different Beams.
4. Apply the different methods to determine the deflection & slope of different beams like double integration method, Area moment method & Macaulay's method
5. Apply the Lame's equation to determine stresses in Thick cylinders

TEXT BOOKS:

1. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman
2. Strength of Materials by Jondar : Galgotia Publications
3. Strength of Materials by Ramamrutham.

REFERENCES:

1. Strength of Materials by Bansal, Lakshmi Publications
2. Strenght of Mateirals by S. Tumoshenko
3. Strength of Materials by R.S. Khurmi; S. Chand & Co. 2005

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93303) THERMODYNAMICS

II Year B.Tech. Mech. Engg. I-Sem   **L T   P C**
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COURSE OBJECTIVES:
1. Understand basic principles of thermodynamics, system control volume, surroundings, and boundaries.
2. Know the role of thermodynamic properties like internal energy, enthalpy, entropy, temperature, pressure, specific volume.
3. Understand temperature - entropy and pressure - volume diagrams.
4. Understand the Laws of thermodynamics and able to apply to various thermal systems.
5. Use isentropic processes to represent the behavior of a system, psychometric properties and use of psychometric chart.
6. Quantify the behavior of power plants based on the Rankine cycle, including the effect of enhancements such as superheat, reheat and regeneration.

UNIT-I:
Introduction: Basic Concepts:
System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale

UNIT-II:
PMM I - Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation.
Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump , Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics

UNIT-III:
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 – Clausius – Clapeyron Equation Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes

UNIT-IV:
Deviations from perfect Gas Model – Vader Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables
Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air.

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

COURSE OUTCOMES:
The students will be able to
1. Understand the basic thermodynamic principles and their applications
2. Observe the thermodynamic principles in heating and air conditioning system, refrigerator and pressure cooker etc.,
3. Analyze of automotive engines, rockets, jet engines and power plants.
4. Analyze various thermodynamic cycles and refrigeration cycles.

TEXT BOOKS :
1. Engineering Thermodynamics / PK Nag /TMH, III Edition
2. Thermodynamics / C.P.Arora.

REFERENCE BOOKS:
1. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
2. Fundamentals of Classical Thermodynamics – G. Van Wylan & R.E. Sonntag – John Wiley Pub.
3. Thermodynamics – J.P.Holman / McGrawHill
4. Engineering Thermodynamics – Jones & Dugan
5. An introduction to Thermodynamics / YVC Rao / New Age
6. Thermodynamics & Heat Engines – Yadav – Central Book Depot, Allahabad.
7. Thermodynamics – Achutan – PHI.
8. Thermodynamics – G.C. Gupta – Pearson Publications.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93304) MACHINE DRAWING

II Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
2	0	4	2

COURSE OBJECTIVES:
1. Understand basics of drawing and represent any matter/object with the help of technical drawings.
2. Produce orthographic drawing of different machine parts.
3. Draw the sectional views of machine parts
4. Develop skill to produce assembly drawings.
5. Develop skill to produce detailed drawings of machine parts from assembly drawing.
6. Prepare and read the blueprint of drawings of machine parts.

Machine Drawing Conventions:

Need for drawing conventions – introduction to ISI conventions

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

Drawing of Machine Elements and simple parts

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

6. Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
7. Keys, cottered joints and knuckle joint.
8. Rivetted joints for plates
9. Shaft coupling, spigot and socket pipe joint.
10. Journal, pivot and collar and foot step bearings.

Assembly Drawings:

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

11. Steam engine parts – stuffing boxes, cross heads, Eccentrics.
12. Machine tool parts: Tail stock, Tool Post, Machine Vices.
13. Other machine parts - Screws jacks, Petrol engine connecting rod, Plumber block

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

COURSE OUTCOMES:
The students will be able to
1. Understand various conventions used in machine drawing
2. Prepare the assembly drawings from component drawing.
3. Understand the use of various machine components.
4. Interpret and make conclusions about a given drawing

TEXT BOOK :
1. Machine Drawing –K.L.Narayana/ Wiley Eastern.
REFERENCE BOOKS :
1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Junnarkar N.D./ Pearson Edu.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93305) MECHANICS OF SOLIDS AND METALLURGY LAB

II Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
0	0	3	2

COURSE OBJECTIVES:
1. To know the micro structural analysis of pure metals like Iron, Cu and AI.
2. To know the micro structural analysis of Mild steels, low carbon steels, high carbon steels.
3. To know the micro structural analysis of Cast Irons.
4. To know the hardness of the various materials with respect to heat treatment
5. To Study the analysis of various beams deflection.
6. To know the properties of various materials by testing methods

(A) Understand the operations of UTM, Impact test, Torsion test, Metallographic study and etching processes etc.

(B) METALLURGY:
1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and AI.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high carbon steels.
3. Study of the Micro Structure of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardenability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

(C) MECHANICS OF SOLIDS LAB:
1. Direct tension test.
2. Bending test on
   a) Simple supported beam.
   b) Cantilever beam.
3. Torsion test.
4. Hardness test.
   a) Brinells hardness test
   b) Rockwell hardness test.
5. Test on springs.
6. Compression test on cube.
7. Impact test.

COURSE OUTCOMES:
The students will be able to
1. Identify grain and grain boundary, crystal structure of different materials.
2. Study the microstructure of various materials.
3. Analyze the correlation between Mechanical and Metallurgical properties.
4. Perform material testing and analyze various material properties.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A93306) FUELS AND LUBRICANTS LAB

II Year B.Tech. Mech. Engg. I-Sem   **L T P C**
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COURSE OBJECTIVES:
1. To Know the flash point & fire point of liquid fuels like petrol & diesel.

2. To know carbon % in liquid fuels.

3. Learn Viscocity of different liquid lubricants

4. Learn the concept of Calorific value of Fuels

Experiments:

1. Determination of Flash and Fire points of Liquid fuels/Lubricants.

2. Carbon residue test: Liquid fuels.

3. Viscosity determination by Redwood & Saybolt methods

4. Determination of Calorific value: Solid/Liquid/Gaseous fuels with Bomb/ Junkers Gas Calorimeter.

5. Greese penetration test.

COURSE OUTCOMES:
The students will be able to
1. Apply different methods to determine the flash point & fire point of liquid fuels.

2. Apply carbon residue test to determine carbon% in liquid fuels.

3. Apply Different methods to determine viscocity of Liquid lubricants.

4. Apply different methods to determine the calorific value of fuels.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94005) COMPUTATIONAL MATHEMATICS

II Year B.Tech. Mech, Civil Engg. II-Sem

      L T P C
      2 0 0 2

Course Objective:

      The main aim of the computational mathematics to examine the constructive abstract methods of mathematics when illustrated with suitable numerical techniques. Computational methods which were developed for purely theoretical reasons suddenly becomes of great importance in engineering mathematics. It follows that the most important objective and purpose in engineering mathematics seems to be that the student become familiar with mathematical thinkings.

Unit-I: Solutions of algebraic and transcendental equations: Introduction, Numerical solution of algebraic and transcendental equations by Bisection Method, Regular-Falsi method
Iteration method, Newton-Raphson's method.

Unit-II: Interpolation: Interpolation Introduction-Errors in polynomial Interpolation, Finite differences-Forward Differences-Backward differences-central differences Symbolic relations and separation of symbols, Newton's formulae for interpolation. Gauss central Difference Formulae, Interpolation with un-equally spaced points-Lagrange's Interpolation formula.

Unit-III: Curve Fitting: Least square method- Fitting of a straight line-Second degree curve, Exponential curve-power curve.

Unit-IV: Numerical Differentiation & Integrations: Numerical differentiation of 1st & 2nd order. Numerical Integration with Trapezoidal rule, Simpson's $1/3^{rd}$ rule, Simpson's (3/8) rule

Unit-V: Numerical solutions of ordinary Differential Equations: Solutions of first order ordinary differential equations by Taylor's series, Picard's Method, Euler's Method, Euler's -Modified Method, Runge-kutta methods.

Recommended Text Books:

2) STEVEN C CHAPRA AND RAYMOND P CANALE, NUMERICAL METHODS FOR ENGINEERS, TMH PUBLISHERS
3) B.S.GREWAL: HIGHER ENGINEERING MATHEMATICS, KHANNA PUBLICATIONS, 2009.

4) M.K. JAIN S.R.K. IYENGAR AND R.K.JAIN: NUMERICAL METHODS FOR SCIENTIFIC ANDENGINEERING COMPUTATION,WILEY EASTERN

REFERENCE BOOK:

1) ERWYN KREYSZIG: ADVANCED ENGINEERING MATHEMATICS, JOHN WILEY AND SONS, 8TH EDITION.
2) T.K.V.IYENGAR: MATHEMATICAL METHODS, S.CHAND AND COMPANY.
3) R.K.JAIN AND S.R.K.IYENGAR : ADVANCED ENGINEERING MATHEMATICS, NAROSA PUBLISHING HOUSE, 2008
4) MATHEMATICAL METHODS BY P.B. BHASKAR RAO, S.K.V.S.RAMA CHARY, M.BHUJANYA RAO, B.S.PUBLICATIONS
5) MATHEMATICAL METHODS BY K.V. SURYANARAYANA RAO, BY SCITECH PUBLICATIONS

Course Outcomes:

By studying Numerical Techniques students are able to solve transcendental equations and solving higher order difference and integrations and also to write the programmes on numerical techniques and matrices which are very useful for the Engineering students in real world applications and in Industrial research.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94205) INSTRUMENTATION AND CONTROL SYSTEMS

II Year B.Tech. ME II -SEM

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COURSE OBJECTIVES:
1. to know the measurement systems, performance characteristics, errors – classification and elimination.
2. to analyze the concepts of displacement, temperature, pressure measurement, calibration procedures and their applications.
3. to know about the Level measurements and types of measurements
4. Speed measurement devices and their applications
5. to understand the concepts of stress strain measurement, humidity, force, torque, power measurement devices and ranges of different instruments.
6. to know the concepts of control systems with block diagrams and applications in temperature control, numerical control, servo control.

UNIT-I

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

UNIT-II

Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo electric, Inductive, capacitance, resistance ionization and photo electric transducers, Calibration procedures.
Measurement of Temperatures: Classification – Ranges – Various principles of measurements – Expansion, Electrical Resistance – Thermistor – Thermo couple – Pyrometers – Temperature indicators.
Measurement of Pressure: Units- classification – different principles used. Manometers, Piston, Bourdon pressure gauge, Bellows- Diaphragm gauges. Low pressure measurement - Thermal conductivity gauges – ionization pressure gauges, McLeod pressure gauge.

UNIT-III

Measurement of Level: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators- Bubbler level indicators.
 Flow Measurement: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer, Laser Doppler Anemometer (LDA).
Measurement of Speed: Mechanical Tachometers – Electrical Tachometers – Stroboscope, Non- contact type of tachometer.
Measurement of Acceleration and Vibration: Different simple instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle.

UNIT-IV

Stress Stain Measurements: Various types of stress and strain measurements - electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.
Measurement of Humidity: Moisture content of gases, Sling psychrometer, Absorption psychrometer, Dew point meter.
Measurement of Force, Torque and Power: Elastic force meters, load cells, Torsion meters, Dynamometers.

UNIT-V

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

COURSE OUTCOMES:
1. Gain knowledge on various parts of machine and IC engine. Understand the design construction of machine parts.
2. To gain knowledge of functioning of parts such as connecting rod, eccentric etc.
3. To understand how heat and electricity are combined in calibrating thermoelectric devices, especially resistance temperature detector, thermo couple.
4. To measure the displacement using LVDT transducer. To gain knowledge on flow measurement using rotometer.

TEXT BOOKS:

1. Measurement systems: Applications & Design/ D.S. Kumar/ Anuradha Agencies.
2. Instrumentation, measurement & analysis / B. C. Nakra & K.K. Choudhary/THM.

REFERENCE BOOKS:

1. Principles of industrial Instrumentation and Control systems/ Chennakesava R Alavala/ Cengage Learning.
2. Instrumentation and control systems / S. Bhaskar/ Anuradha agencies.
3. Experimental Methods for Engineers/ Holman/ McGraw Hill.
4. Mechanical and Industrial Measurements/ R.K. Jain/ Khanna Publishers.
5. Mechanical Measurements / Sirohi and Radhakrishna / New Age.
6. Instrumentation & Mech. Measurements/ A.K.Tayal / Galgotia Publications.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94301) FLUID MECHANICS & HYDRAULIC MACHINERY

II Year B.Tech. Mech. Engg. II-Sem
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COURSE OBJECTIVES:
1. Understand the properties of fluids and flow characteristics. Determine pressure variation in a flowing fluid using Bernoulli's principle.
2. Determine velocity and acceleration of a fluid at a point. Apply the different conservation equations of mass, momentum, and energy to fluid flow problems.
3. Apply basic fluid mechanics principles to the flow of viscous fluids in pipes and ducts. Calculate the head losses in simple pipes and channels.
4. Describe the construction and working of turbines and pumps. Determine optimum speed for pump operation.
5. Determine radial and axial forces on impeller. Understand centrifugal pump impeller design .
6. Evaluate various suction configurations and their impact on pump performance.

UNIT-I:
Fluid Statics: Dimensions and Units: physical properties of fluids-specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion-atmospheric, gauge and vaccum pressure- measurement of pressure- piezometer, U-Tube and Differential Manometers.

UNIT-II:
Fluid kinematics: stream line, path line and steak line, classification of flows steady & un steady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three dimensional flow.
Fluid dynamics: Surface & body forces Euler's & Bernouli's equations for flow along a stream line, moment equation and its applications on force on pipe bend. Measurement of flow: pitot tube, venture meter and orifice meter, flow nozzle.

UNIT-III:
Closed conduit flow: Reynold's experiment-Darcy Weisbach equation-minor losses in pipes-pipes in series and pipes in parallel-total energy line-hydraulic gradient line.
Boundary layer concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivations) boundary layer in transition, separation of boundary layers submerged objects-drag and lift .

UNIT-IV:
Hydraulic Turbines & Turbo Machinery: Hydro dynamic force on jets on stationary and moving plate, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency , flow over radial vanes.

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

UNIT-V:
Performance of hydraulic turbines and pumps: Geometric similarity, unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbines, cavitation, surge tank, water hammer.
Centrifugal pumps: Classification, working, work done-barometric head-losses and efficiencies specific speed-performance characteristic curves, NPSH.
Reciprocating pumps: Working, discharge, slip, indicator diagrams.

COURSE OUTCOMES:
The students will be able to
1. Apply mathematics and basic sciences and translates this knowledge to understand fluid flow principles and their applications.
2. Understand fundamental knowledge of the mechanics of fluid at rest and in motion.
3. Observe and analyze fluid phenomena by developing and using the principles, laws for analyzing fluid interactions with natural and constructed systems.
4. Understand fundamental knowledge & performance of different turbines & pumps.

TEXT BOOKS:
1. Hydraulics, Fluid mechanics and hydraulic machinery by MODI and SETH
2. Fluid mechanics and hydraulic machines by Bhansal

REFERENCES:
1. Fluid mechanics and fluid power engineering by D.S.Kunar, Kotaria and sons.
2. Fluid mechanics and machinery by D. Rama Durgaiah, New age international.
3. Hydraulic machines by Banga and Sharma, Khanna publishers

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94302) THERMAL ENGINEERING-I

II Year B.Tech. Mech. Engg. II-Sem

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COURSE OBJECTIVES:
1. Demonstrate the differences between air standard cycles and actual cycles.
2. Understand the working principle of internal combustion engine and its components details, fuel injection carburetor, cooling and lubrication systems.
3. Differentiate normal and abnormal combustion in spark ignition engines.
4. Know various stages of combustion in compression ignition engines, diesel knock.
5. Solve problems on performance of engines, brake power, mechanical efficiency, and specific fuel consumption.
6. Understand constructional details and working principle of different types of compressors.

UNIT-I
I.C. Engines:
Classification - Working principles of Four & Two stroke engine, SI & CI engines, Valve and Port Timing Diagrams, Air – Standard,   air-fuel and actual cycles - Engine systems – Carburetor and Fuel Injection Systems for SI engines, Fuel injection systems for CI engines, Ignition, Cooling and Lubrication system, Fuel properties and Combustion Stoichiometry.

UNIT-II
Normal Combustion and abnormal combustion in SI engines – Importance of flame speed and effect of engine variables – Abnormal combustion, pre-ignition and knocking in SI Engines – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types of SI engines.
Four stages of combustion in CI engines – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence in Diesel engine – open and divided combustion chambers and fuel injection– Diesel fuel requirements and fuel rating

UNIT-III
Testing and Performance:
Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart
Classification of compressors – Fans, blowers and compressors – positive displacement and dynamic types – reciprocating and rotary types.

UNIT-IV
Reciprocating Compressors: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance volume, staged compression, under cooling, saving of work, minimum work condition for staged compression

Rotary Compressor(Positive displacement type): Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

UNIT-V
Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.
Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency-pressure rise calculations – Polytropic efficiency.

COURSE OUTCOMES:
The students will be able to:
1. Work practically on IC engines to know about various components and can perform assemble and dissemble the parts.
2. Draw port and valve timing diagrams of any engine. They can design piston dimensions and number of cylinders for any BHP requirement.
3. Differentiate light vehicles, heavy vehicles and differentiate between petrol, diesel engines 4-stroke and 2-stroke engines.
4. Analyze the conditions inside the cylinder when combustion takes place by providing sufficient instrumentation to the engines.

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

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94303) KINEMATICS OF MACHINES

II Year B.Tech. Mech. Engg. II-Sem

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COURSE OBJECTIVES:
1. To understand the concept of machines, mechanisms and related terminologies.
2. To able to analyze a mechanism for displacement, velocity and acceleration at any point in a moving link.
3. To understand the theory of gears, gear trains.
4. To understand the theory of cams.
5. To understand the different steering gear mechanisms,
6. To understand power drives.

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

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

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

Steering gears: Conditions for correct steering – Davis Steering gear, Ackerman's steering gear. **Hooke's Joint:** Single and double Hooke's joint–velocity ratio-applications-problems.

UNIT-III
Kinematics: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration – Graphical method – Application of relative velocity method.

Plane motion of body: Instantaneous center of rotation- centrodes and axodes – Three centers in line theorem – Graphical determination of instantaneous center, determination of angular velocity of points and links by instantaneous center method.

Kliens construction - Coriolis acceleration - determination of Coriolis component of acceleration

Analysis of Mechanisms: Analysis of slider crank chain for displacement- velocity and acceleration of slider – Acceleration diagram for a given mechanism.

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.

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

COURSE OUTCOMES:

The students will be able to
1. Identify the basic relations between distance, time, velocity and acceleration.
2. Distinguish the basics of kinematics and kinetics of motion.
3. Develop familiarity with application of kinematics theories to real-world machines.
4. Understand analytical linkage analysis, determine cam profiles and understand gear trains.

TEXT BOOKS:
1. Theory of Machines /S.S.Rattan – Tata McGraw Hill Publishers.
2. Kinematics & Dynamics Of machinery/Norton/TMH

REFERENCE BOOKS:

1. Theory of Machines / Thomas Bevan/CBS
2. Theory of Machines / Sadhu Singh / Pearson.
3. Theory of Machines / Shigley / Oxford
4. Mechanism and Machine Theory / JS Rao and RV Duggipati / New Age
5. Theory of Machines by / R.K. Bansal (Lakshmi Publications).

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94304) PRODUCTION TECHNOLOGY

II Year B.Tech. Mech. Engg. II-Sem

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COURSE OBJECTIVES:
1. Student will be able to understand the principles of casting, welding processes.
2. Student will be able to understand the principles of metal forming processes.
3. The student will be able to understand the principles of various manufacturing processes and to apply them in producing industrial products economically.
4. Students will get the knowledge of Inert gas welding, TIG & MIG,
5. Students will get the knowledge of advanced welding technologies like, friction welding, Induction welding.
6. Students will able to understand the process of extrusion of metals – Types, applications

UNIT-I
Casting : Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.
Methods of Melting - Crucible melting and cupola operation – Defects in castings;
Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.
Solidification of casting – Solidification of pure metal – Nucleation and grain growth, casting design considerations

UNIT-II
Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting – standard time and cost calculations. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

UNIT-III
Inert Gas Welding _ TIG Welding, MIG welding, Friction welding, induction welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT-IV
Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth.Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements
Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning.
Types of presses and press tools. Forces and power requirement in the above operations.

UNIT-V

Extrusion of Metals : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

Forging Processes : Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

COURSE OUTCOMES:

The students will be able to

1. Apply the knowledge of casting, welding joints and forces and power requirements in metal forming processes.
2. Apply their knowledge in understanding the melting, solidification, pattern allowances, gating and riser design of mold cavity, aspects of casting.
3. Understand basic calculations of forces and power requirements in the metal forming operations.
4. Demonstrate application of welding using the arc welding, gas welding, resistance welding, soldering and brazing.

TEXT BOOKS :

1. Manufacturing Technology / P.N. Rao/TMH

REFERENCE BOOKS :

1. Production Technology / R.K. Jain
2. Metal Casting / T.V Ramana Rao / New Age
3. Principles of Metal Castings / Rosenthal.
4. Welding Process / Parmar /
5. Production Technology /Sarma P C /
6. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson Edu.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94208) INSTRUMENTATION AND CONTROL SYSTEMS LAB

II Year B.Tech. ME II -SEM   **L T P C**
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Objectives:
1. To Provide good knowledge of Instrumentation systems & their Applications.
2. To provide foundation in basic science & mathematics necessary to formulate, solve & analyze control & instrumentation problems.
3. To prepare the students have   knowledge in Instrumentation Industry & motivate for higher studies.
4. To Provide knowledge of advance control theory & its applications to Engineering problems.
5. To provide information on sensors (Transducers), Temperature sensors (Thermocouples, Thermistors), strain   gauges, pressure sensors, flow sensors, light sensors.

List of experiments
1. Calibration of Pressure Gauges.
2. Calibration of transducer for temperature measurements.
3. Study and Calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermo couple for temperature measurements.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of Photo and magnetic speed pickup for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a Rotameter 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.

Outcomes:
1. Be able to measure common physical quantities using common sensors.
2. Be able to understand & apply basic science, circuit theory, control theory signal processing & apply them to engineering problems.
3. Ability to understand & analyze instrumentation system & their applications to various industries.
4. Ability to understand & analyze, linear & digital Electronic circuits.
5. Ability to model & analyze transducers, Rectifiers, Resistors & sensors.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94306) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

II Year B.Tech. Mech. Engg. II-Sem
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COURSE OBJECTIVES:
1. Calculate different parameters such as coefficient of friction, coefficient of discharge, coefficient of impact, power, efficiency etc. of various experiments.
2. Determine pressure variation in a flowing fluid using Bernoulli's principle applications such as Venturimeter, orifice meter.
3. Apply basic fluid mechanics principles to the flow of water in pipes, pumps and turbines.
4. Calculate the head losses, flow, friction in pipes.
5. Test the performance of turbines and pumps.
6. Evaluate the forces and their impact of jet on flat and curved vanes.

Experiments:

1. Calibration of Venturimeter & Orifice meter

2. Determination of Coefficient of discharge for a small orifice by a constant head method.

3. Determination of Coefficient of discharge for an external mouth piece by variable head method.

4. Determination of Coefficient of loss of head in a sudden contraction and friction factor.

5. Performance test on single stage centrifugal pump

6. Performance test on reciprocating pump

7. Impact of jet on vanes

8. Performance and Specific speed test on Pelton wheel.

9. Performance and specific speed test on Francis Turbine

10. Performance and specific speed test on Kaplan Turbine

11. Performance test on multi stage centrifugal pump

12. Drag and Lift Coefficients of an Aerofoil model.

 Any ten of the above experiments are to be covered.

COURSE OUTCOMES:

The students will be able to

1. Apply knowledge of fluid mechanics and hydraulic machines and translates this knowledge for understanding fluid flow principles and their application to experiments.
2. Practical exposure by using components vacuum gauge, pressure gauge, manometers, pipes, motors, pumps & turbines.
3. Use comparison of theoretical values with the real parameters.
4. Know and understand the experimental analysis in turbines and pumps with parameters such as discharge, head of water, speed of brake drum.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94307) PRODUCTION TECHNOLOGY LAB

II Year B.Tech. Mech. Engg. II-Sem   **L   T   P   C**
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COURSE OBJECTIVES:
Students will be able to
1. Know the experimental skills of various production processes.
2. Learn casting process, welding process.
3. Learn extrusion process.
4. Learn the processing of plastics.
5. Know the welding basics and concept of various process of welding.
6. Select the tool materials for various processes

Metals Casting Lab :

1.   Moulding   -   2 Exercises
2.   Melting & Casting -   Demonstration
3.   Pattern Marking   -   1 Exercise

Welding Lab:

1) Arc Welding:

   a) Effect of polarity on welds strength & Heat affected zone
   b) Effect of current on weld strength and Heat affected zone

2) Spot Welding – Effect of current on weld strength.

3) Gas welding and brazing exercises.

Mechanical Press Working:

1) Blanking & Piercing operation & Study of simple Compound and progressive press tools.
2) Hydraulic Press: Deep Drawing and Extrusion Operations.
3) Bending and other operations.

Processing of Plastics:

1) Injection Moulding
2) Blow Moulding

COURSE OUTCOMES:

The students will be able to

1. Understand basic knowledge and concepts of various experiments.
2. Perform joining of materials (similar/dissimilar) using welding.
3. Understand the concepts of extrusion and design of die.
4. Operate injection molding and blow molding machines.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A94006) GENDER SENSITIZATION

II Year B.Tech. II-Sem
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Pre-Requisites: None

Course Objectives:

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

Unit – 1
Gender: Why Should We Study It?

Unit – 2
Socialization: Making Women, Making Men
2.1   Introduction
2.2   Preparing for womanhood
2.3   Growing up male
2.4   First lessons in caste
2.5   Different masculinities

Unit – 3
Housework: The Invisible Labour
3.1   "My mother does not work"
3.2   "Share the load"

Unit – 4
Missing Women: Sex Selection and Its consequences
4.1   Declining sex ratio
4.2   Demographic consequences

Unit – 5
Knowledge: Through the Lens of Gender
5.1   Point of view
5.2   Gender and the structure of knowledge
5.3   Further reading: Unacknowledged women artists of Telangana

Course Outcomes:

- ➢ Students will have developed a better understanding of important issues related to gender in contemporary India.
- ➢ 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.
- ➢ Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- ➢ Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- ➢ Men and women students and professionals will be better equipped to work and live together as equals.
- ➢ Students will develop a sense of appreciation of women in all walks of life.
- ➢ 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.

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VAAGDEVI COLLEGE OF ENGINEERING
AUTONOMOUS

(A95621) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

III Year I-Sem, Mech. Engg.

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Course Objectives:
To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations namely. Demand and supply, production function, cost analysis, markets forms of business organizations, capital budgeting and financial accounting and financial analysis by using ratios.

UNIT – I
Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT – II
Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs. Variable costs, Explicit costs Vs.Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)-Managerial Significance and limitations of BEA.

UNIT – III
Introduction to Markets & Pricing strategies: Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Strategies, Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

UNIT – IV
Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance, Nature and scope of 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: Double-Entry Book Keeping, Journal, Ledger, Trial Balance – Final Account (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.) Computation, Analysis and Interpretation of Liquidity Ratios (Current Ration and quick ratio), Activity Ratios (Debt-Equity ratio, Interest

Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

Text Books
Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

References
1) Ambrish Gupta,Financial Accounting for Management, Pearson Education, New Delhi, 2004.
2) Shim & Siegel: Financial Accounting (Schaum's Outlines), 2/e TMH, 2004
3) Chary: Production and Operations Management, 3/e, TMH, 2004.
4) Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson, 2003.
5) Narayanaswamy: Financial Accounting-A Managerial Perspective, PHI, 2005.
6) Peterson & Lewis: Managerial Economics, 4th Edition, Pearson Education, 2004.
7) Raghunatha Reddy & Narasimhachary: Managerial Economics & Financial Analysis, Scitech, 2005.
8) S.N.Maheswari & S.K. Maheswarial, Financial Accounting, Vikas, 2005.
9) Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2004.
10) Dwivedi: Managerial Economics, 6th Ed., Vikas, 2002.
11) Yogesh Maheswari: Managerial Economics, 2nd Ed., PHI, 2005

Course Outcomes:
1) To study fundamental concepts in managerial economics and financial analysis including certain basic issues governing the business operations.
2) To learn the concepts of demand, elasticity of demand and demand forecasting and methods of demand forecasting.
3) To learn various issues involved in production decision analysis.
4) To gain the knowledge of Break – Even Analysis and its importance in managerial decision making.
5) To learn different types of market environment under various types of competition.
6) To gain the knowledge of new economic environment in post – liberalization scenario.
7) To know the concepts of capital budgeting and various methods of capital budgeting and its application in business decision making.

Learning Outcomes:
1) Have an ability to understand the market dynamics namely, demand, demand forecasting, elasticity of demand, pricing methods and pricing in different market structures.
2) Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
3) Have an ability to understand the application of BEA in business decision making.
4) Have an ability to understand how capital budging decisions are carried out in business organization.
5) Have an ability to record the business transactions and following accounting process.
6) Have an ability to analyse and interpret the financial statements through ratio analysis.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A95301) MACHINE TOOLS

III Year B.Tech. Mech. Engg. I-Sem

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Course Objectives:
1. Student will be able to understand construction and working of various machine tools like lathe, milling, shaping and drilling etc.
2. Machines, drill press, grinding machines, etc.
3. Student will understand principles and economics of metal cutting and able to select the economical machining process.
4. Student will demonstrate the knowledge of various cutting tool materials and will be able to select or design cutting tool material and tool geometries for the machining process and work material.
5. Students will be able to select the optimum cutting parameters i.e. feed, cutting speed, depth of cut for particular machining process. They are also able to know the effective working of machines and surface quality of machines.
6. Students will learn to monitor cutting tool conditions through force transducers and surface finish inspection.

UNIT – I
ELEMENTARY TREATMENT OF METAL CUTTING THEORY
Element of cutting process – Geometry of single point tool and angles chip formation and types of chips – built up edge and its effects chip breakers. Mechanics of orthogonal cutting – Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability – Tool materials. Kinematic schemes of machine tools – Constructional features of speed gear box and feed gear box.

UNIT – II
ENGINE LATHE
Principle of working, specification of lathe – types of lathe – work holder's tool holders – Box tools Taper turning thread turning – for Lathes and attachments. Turret and capstan lathes – collets chucks – other work holders – tool holding devices – box and tool layout. Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes – tool layout and cam design.

UNIT – III
SHAPING SLOTTING AND PLANING MACHINES
Principles of working – Principal parts – specification classification, operations performed. Kinematic scheme of the shaping slotting and planning machines, machining time calculations.
Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine. Deep hole drilling machine. Kinematics scheme of the drilling and boring machines

UNIT – IV
MILLING MACHINE
Principles of working – specifications – classifications of milling machines – Principal features of horizontal, vertical and universal milling machines – machining operations Types geometry of milling cutters – milling cutters – methods of indexing – Accessories to milling machines, kinematic scheme of milling cutters – milling cutters – methods of indexing.

Grinding machine – Fundamentals – Theory of grinding – classification of grinding machine – cylindrical and surface grinding machine – Tool and cutter grinding machine – special types of grinding machines – Different types of abrasives – bonds specification of a grinding wheel and selection of a grinding wheel Kinematic scheme of grinding machines

UNIT – V
LAPPING, HONING AND BROACHING MACHINES
Comparison to grinding – lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations

Principles of design of Jigs and fixtures and uses. Classification of Jigs & Fixtures – Principles of location and clamping – Types of clamping & work holding devices. Typical examples of jigs and fixtures.

Text Books:
1. P.C. Sharma, "A text book of manufacturing Technology – II", S. Chand, 2010, ISBN 13: 9788121928465.
2. Serope Kalpakjian and Steven R.Schmid, "Manufacturing Engineering and Technology", Ed.4, Pearson Publications, 2001, *ISBN*: 0132272717.
3. Workshop Technology Vol – II by B.S. Raghuvamsi.
4. Workshop Technology Vol – II by J.K. Hazra choudary.

Reference Books:
1. P.N.Rao, "Manufacturing Technology" Vol.2, Metal Cutting and Machine Tools, TMH, 2009, Ed.2, *ISBN Number*: 0074631802.
2. R.K.Jain, "Production Technology" Khanna Publishers, 2001, *ISBN Number*: 978-8174090997.

Course Outcomes:
The students will be able to
1. Apply cutting mechanics to metal machining based on cutting force and power consumption.
2. Operate lathe, milling machines, drill press, grinding machines, etc.
3. Evaluate mach inability of different materials using specific cutting forces and surface finish.
4. Write CNC programs and conduct CNC machining.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A95302) DYNAMICS OF MACHINERY

III Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	0	0	4

Course Objectives:
1. Analyze the motions of mechanisms, design mechanisms to obtain the desired motions and analyze forces in machines & fundamentals of gyroscopic couple.
2. Understand the friction in clutches.
3. Understand the turning moment diagrams and flywheels.
4. Understand the balancing of rotary and reciprocating masses.
5. Understand the fundamentals in different vibrations.
6. Analyze the effect of vibration of machine parts under the operating conditions.

UNIT – I
STATIC AND DYNAMIC FORCE ANALYSIS OF PLANAR MECHANISMS
Introduction – Angular Motions – Gyroscopes – effect of precession - Free Body Diagrams – Conditions for equilibrium – Two, three and four force members – Inertia forces and D' Alembert's Principle – planar rotation about a fixed center.

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

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- effort and power of the governors.

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

UNIT – V
VIBRATIONS
Free Vibration of mass attached to vertical spring – Simple problems on forced damped vibration. Vibration Isolation & Transmissibility-Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.

Text Books:
1. SS Ratan, "Theory of Machines", Mc Graw Hill, 3rd Ed. 2009, ISBN Number 9780070144774.
2. R.S.Khurmi & J.K.Gupta, "Theory of Machines", Eurasia Publishing House 2012, *ISBN Number*: 978-8121925242.

Reference Books:
1. P.L. Ballaney, "Theory of Machines and Mechanisms", Khanna Publishers, 3rd Ed., 2003, ISBN Number: 978-8174091222.
2. R.L. Norton, "Kinematics and Dynamics of Machinery", Mc. Graw Hill 1st Ed., *ISBN Number*: 978-0070144804
3. Uicker, Pennock and Shigley, "Theory of Machines and Mechanisms", Oxford, 1st Ed. *ISBN Number*: 978-0070144804

Course Outcomes:
The students will be able to
1. Evaluate the forces and torques in mechanisms and machines in operation. Know the function of governors, clutches and bearings, and do the problems on these.
2. Evaluate the frictional torque in clutches and braking torque in brakes.
3. Evaluate the dimensions of flywheels for different IC engines.
4. Evaluate the balancing masses in rotary and reciprocating balancing.
5. Evaluate the frequencies of different vibrations.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A95303) DESIGN OF MACHINE MEMBERS-I

III Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	0	0	4

Course Objectives:
1. Use references that provide tabulated physical and mechanical data that are useful for mechanical design engineers.
2. Select the material and its properties for the optimum design of a component.
3. Understand the design principles of various machine members and able to apply the principles in designing new parts as per its functional requirements.
4. Understand the theories of failures.
5. Apply theories of failures in defining the failure criteria of the part.
6. Design the various powers drives suitable to transfer power requirements.

UNIT – I
INTRODUCTION
Definition, Types of design, General Considerations in the design – Design Procedure – Selection of Material for design and manufacturing.
Stresses in Machine Members: Simple stresses – Combined stresses - stress strain relation – Various theories of failure – factors of safety – Design for strength and rigidity. The concept of stiffness in tension, bending, torsion and combined situations.

UNIT – II
STRENGTH OF MACHINE ELEMENTS
Stress concentration – Theoretical stress Concentration factor – Fatigue stress concentration factor – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Goodman-s line – Soderberg's line.

UNIT – III
DESIGN OF FASTENERS
Riveted joints – definition, types and design - Welded joints - definition, types and design – Bolted joints – Design of bolts with initial stresses – Design of joints under eccentric loading.

UNIT – IV
KEYS, COTTERS AND KNUCKLE JOINTS
Design of keys-stresses in keys-cottered joints- spigot and socket, sleeve and cotter, gib and cotter joints-Knuckle joints.

UNIT – V
SHAFTS AND SHAFT COUPLINGS
Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads.
Shaft Coupling: Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings – Flange coupling (Modified) – One Case Study.

Text Books:
1. P.Kannaiah / Machine Design / Sci-Tech, 4th Ed. 2012, / ISBN-13: 978-81-8371-151-7.
2. Pandya and Shah / Machine Design / Charotar, 18th Ed., 2012, / *ISBN*, : 978-93-80358-51-2.

Reference Books:
1. Schaum Series, "Machine deign", Mc.Graw Hill, ISBN-13: 9780070255951.
2. R.S.Kurmi, J.K.Gupta, "Machine design", S. Chand, 14th Ed., ISBn Number-13: 9788121925372.
3. S.Md.Jalaludeen, "Machine Design", Anuradha Publications, ISBN-13: 9788189638214.

Course Outcomes:
The students will be able to
1. Design a particular machine element and make use of standards parts and dimensions using design data book.
2. Design shaft, shaft couplings like flange couplings, flexible couplings.
3. Determine the Stresses and deflections of helical springs, bolded joints keys, cotters, knuckle joints.
4. Design riveted and welded joints.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A95304) ENGINEERING METROLOGY

III Year B.Tech. Mech. Engg. I-Sem

L T P C
4 0 0 4

Course Objectives:
1. To understand the basic principles of metrology this deals with the measuring instruments and the precision measurement techniques.
2. To apply these principles to analyze measurement problems.
3. To apply their knowledge to Gears, Surface engineering, Instrumentation.
4. To know the Measuring machines, Machine tool alignment, Screw threads, and Surface texture variations.
5. To learn limits, fits, tolerances, linear, angular measurements and comparators for the application of mechanical engineering components, parts, assembly, interchangeability, standards of measurement.
6. To use engineering metrology principles to design 'Go' and 'No-Go' gauges.

UNIT – I
SYSTEM OF LIMITS AND FITS
Introduction – normal size, tolerance limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard institution system – British standard system, International Standard system for plain and screwed work.

UNIT – II
LINEAR MEASUREMENT
Length standard, line and end standard slip gauges – calibration of the slip gauges. Dial indicator, micrometers.
Measurement of Angles and Tapers: Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.
Limit Gauges: Taylor's principle – Design of go and No go gauges, plug, ring, snap, gap, taper, profile and position gauges.

UNIT – III
OPTICAL MEASURING INSTRUMENTS
Tool maker's microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer.
Flat Surface Measurement: Measurement of flat surfaces – instruments used – straight edges – surface plates – optical flat and auto collimator.
Surface Roughness Measurement: Differences between Surface Roughness and surface waviness – Numerical assessment of surface finish – CLA, R.M.S. values – Rz values, Methods of measurement of surface finish – profilograph. Talysurf, ISI symbols for indication of surface finish.

UNIT – IV
MEASUREMENT THROUGH COMPARATORS
Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.
Screw Thread Measurement: Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.

UNIT – V
SURFACE ENGINEERING
Surface texture and properties, surface cleaning techniques, surface integrity, wear and its measurements, lubricants and its selection for reducing wear, principles of corrosion and remedial measures, Laser applications for surface modifications.
Surface Treatments: Mechanical surface treatment and coating, casehardening and surface coating, thermal spraying, vapour deposition, Ion implantation. Diffusion coating, Electro plating, Electro less plating and Electro forming, Ceramic, Organic and Diamond coating.

Text Books:
1. Serope Kalpakjian and Steven R.Schmid, "Manufacturing Engineering and Technology", Pearson Publications, 5th Ed. 2009, *ISBN*: 0132272717.
2. Anand Bewoor, Vinay A.Kulkarni, "Metrology and Measurement", TMH, 2009 1st Ed., *ISBN* 9780070140004.
3. Metrology and Surface engineering by Mahajan & RK Jain.

Reference Books:
1. Connie Dotson, "Fundamentals of Dimensional Metrology", Thomson, 2003 6th Edition, *ISBN*-13: 9781133600923.
   JR Davis, "Surface Engineering for corrosion and wear resistance", Woodhead Publishers, ISBN-13: 978-08717070

Course Outcomes:
At the end of the course student will get ability to
1. Apply mathematics to calculations of surface texture assessment by using C.L.A. and R.M.S. methods and linear, angular measurement by using various micrometers, bevel protractor, auto collimator etc.
2. Understand and apply principles of optics, interference, light to optical flats, interferometers, microscopes and optical measuring instruments.
3. Use references that provide tabulated physical data that are useful to assembly of components, clearance, transition, interference fits.
4. They are able to understand the basic techniques of surface engineering, surface treatment, surface   coatings, and surface cleanings.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A95305) THERMAL ENGINEERING – II

III Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	0	0	4

Course Objectives:
1. Demonstrate the understanding of working principle of steam power plant.
2. Understand the working principle of internal combustion engine and its components details, fuel injection carburetor, cooling and lubrication systems.
3. Differentiate the thermodynamic analysis of steam nozzles, turbines.
4. Know various stages of combustion in compression ignition engines, diesel knock.
5. Solve problems on problems on performance of boilers, steam turbines, turbines.
6. Understand constructional details and working principle of different types of compressors.

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, Stoichiometry, and Flue gas analysis.

UNIT – II
BOILERS
Classification – Working principles – with sketches including H.P. Boilers – **Mountings and Accessories** – working principles, boiler horse power, equivalent evaporation, efficiency and heat balance; **Draught** - classification – Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught, induced and forced.

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

UNIT – IV
REACTION TURBINES
Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction – velocity diagram – Parson's reaction turbine – condition for maximum efficiency.
Steam Condensers: Requirements of steam condensing plant – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, air pump, cooling water requirement.

UNIT – V
GAS TURBINES
Simple gas turbine plant – Ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating – closed and semi- closed cycles – merits and demerits, brief concepts about compressors, combustion chambers and turbines of Gas turbine plant.

Case Studies:
1. Case study on Thermal Failures like Boiler Failures.
2. Case study on "The Stanley Steamer Automobile"
3. Case study on "The Drinking Bird as a Heat Engine.

Text Books:
1. R.K. Rajput, "Thermal Engineering", Laxmi Publications, 9th Ed. 2013, *ISBN*,: 978-93-81159-52-1.
2. Mahesh M Rathore, "Thermal Engineering", TMH, *ISBN*: 9780070681132.

Reference Books:
1. R.Yadav, "Thermodynamics and Heat Engines", Central Book Dept, *ISBN*: 9788185444031.
2. P.Khajuria and S.P.Dubey, "Gas Turbines and Propulsive Systems", Dhanpatrai, *ISBN*: 9788189928483.
3. M.L.Mthur & Mehta, "Thermal Engineering", Jain Bros., *ISBN* : 8186321861.

Course Outcomes:
The students will be able to
1. This course provides the basis for subsequent courses involving the analysis, design and/or operation of engineered systems: power plants, jet propulsive systems, Rockets.
2. The student will demonstrate an ability to enumerate the differentiating features between a water tube and fire tube boilers.
3. The student will demonstrate an ability to draw the heat balance sheet of a boiler.
4. The student will demonstrate ability to show by graphical method, variation in the pressure and velocity of steam in an impulse turbine.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A95306)   METROLOGY AND MACHINE TOOLS
LABORATORY

III Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
0	0	3	2

Course Objectives:
1. Apply the principles of metrology with the measuring instruments, Vernier calipers, micrometer, bevel protractor, tally surf, tool maker's microscope, sine bar etc.
2. Employ their knowledge to lathe, milling alignment tests with dial Gauges, spirit levels.
3. Study about various instruments used in industries

METROLOGY LAB
1. Measurement of lengths, heights, diameters by Vernier calipers.
2. Measurement of bores by internal micrometers.
3. Use of gear teeth, Vernier calipers and checking the chordal addendum and chordal height of spur gear.
4. Machine tool "alignment test on the lathe".
5. Tool makers' microscope and its application.
6. Angle and taper measurements by Bevel protractor, Sine bars, etc.
7. Measurement of different heights by using Vernier height gauge.

Course Outcomes:
Students will be able to
1. Use different types of measuring instruments
2. Perform different operations on Lathe machines.
3. Measure angles and taper measurements.
4. Calibrate the instruments involving different parameters.

Course Objectives:
1. Apply practical knowledge of machining to operate machine tools.
2. Operate lathe, milling machine, drilling, grinding, shaper, slotting machines.
3. Select cutting tool materials and tool geometries for different metals.
4. Perform turning, taper turning, thread cutting and knurling operations on lathe.
5. Apply the principles of metrology with the measuring instruments, Vernier calipers, micrometer, bevel protractor, tally surf, tool maker's microscope, sine bar etc.
6. Employ their knowledge to lathe, milling alignment tests with dial Ganges, and spirit levels.

MACHINE TOOLS
1. Introduction of general purpose machines – Lathe, Drilling machine, Milling machine, Shaper.
2. Planning machine, slotting machine, surface grinder and tool and cutter grinder.
3. Step turning and taper turning on lathe machine.
4. Thread cutting and knurling on lathe machine.
5. Drilling and tapping.

6. Shaping and planning.
7. Slotting.
8. Milling.
9. Cylindrical Surface Grinding.
10. Grinding of Tool angles.

Text Books:
1. D.S. Kumar, "Measurement systems: Applications & Design", Anuradha Agencies, *ISBN* 13: 9788120004238.
2. B.C. Nakra & K.K. Choudhary, "Instrumentation, measurement & analysis", TMH 3rd Ed. *ISBN*: 9780070151277.
3. P.C. Sharma, "A text book of manufacturing Technology – II", S.C. Chand, ISBN 13: 9788121928465.
4. Anand Bewoor, Vinay A. Kulakarni, "Metrology and Measurement", TMH, 2009 1st Ed., *ISBN* 9780070140004.

Reference Books:
1. P.N.Rao, "Manufacturing Technology", Metal Cutting and Machine Tools, TMH, 2009, 3rd Ed. Vol.2, *ISBN*-13 9781259029561.
2. Serope Kalpakjian and Steven R Schmid, "Manufacturing Processes for Engineering Materials", Pearson Publications, 5th Ed. 2009 / *ISBN*: 0132272717.
3. R.Rajendra, "Principles of Engineering Metrology", JAICO Publications, 2008, 1st Ed., ISBN-13 : 9788179928370.
4. Serope Kalpakjian and Steven R.Schmid, "Manufacturing Engineering and Technology", Pearson Publications, 5th Ed. 2009, *ISBN*: 0132272717.
5. R.K. Jain, "Mechanical and Industrial Measurement", Khanna Publishers, ISBN Number: 9788174091918.

Course Outcomes:
The students will be able to
1. This course provides fundamental knowledge and principles of machining to the operation of different marching processes on machine tools.
2. The course draws upon knowledge of metal cutting principles turnouts the lathes, milling, drilling, shaping, slotting, and grinding machines.
3. The course shows how to evaluate machined work piece surface finish and dimensional accuracy using metrology equipment.
4. Students will be able to differentiate the lubrication and cooling effects of various cutting fluids.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A95307) THERMAL ENGINEERING LABORATORY

III Year B.Tech. Mech. Engg. I-Sem   **L T P C**
                                                                            0 0 3 2

Course Objectives:
1. Demonstrate the working principle of an IC engine.
2. Conduct test on the engines to its performance parameters like Brake thermal efficiency, Brake specific fuel consumption, and Mechanical efficiency.
3. Estimate useful amount of heat energy and also various heat losses in the engine.
4. Conduct tests on different engines like Petrol, Diesel, 4-stroke, Single cylinder and Multi cylinder engines.
5. Know various loads to be applied on the engine like electric, mechanical and hydraulic loading.
6. Know the performance of a compressor unit.

Perform any 10 out of the 12 exercises:
1. I.C. Engines Valve / Port Timing Diagrams.

2. I.C. Engines Performance Test 4 – Stroke SI engine.

3. I.C. Engines Performance Test on 2-stroke petrol Engine.

4. I.C. Engines Morse, motoring / retardation tests.

5. I.C. Engines Heat balance on CI/SI engine

6. I.C. Engines economical speed test on a SI engine.

7. I.C. Engines effect of A/F Ratio in a SI engine

8. Performance test on variable compression ratio engine

9. I.C. Engines Performance Test on a 4S CI engine at constant speed

10. Volumetric efficiency of a reciprocating Air-compressor unit.

11. Dis-assembly / Assembly of engines.

12. Study of Boilers

Text Books:
1. R.K.Rajput, "Thermal Engineering", Lakshmi Publications, 9th Ed. 2013, *ISBN*,: 978-93-81159-52-1.
2. Mahesh M Rathore, "Thermal Engineering", TMH 1st Edition, *ISBN*: 9780070681132.

Reference Books:
1. R.Yadav, "Thermodynamics and Heat Engines", Central Book Dept., *ISBN*: 9788185444031.
2. P.Khajuria and S.P.Dubey, "Gas Turbines and Propulsive Systems", Dhanpatrai, *ISBN*: 9788189928483.
3. M.L.Mthur & Mehta, "Thermal Engineering", Jain Bros., *ISBN*: 8186321861.

Course Outcomes:

The students will be able to
1. Student is able to identify various types of engines and their parts.
2. Student can understand the power of different engine and where they can be used.
3. Student is able to estimate the performance of different engine and analyze them.
4. Student is able to run the engines to set better efficiencies by knowing Brake specific fuel consumption of the engines.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96301) FINITE ELEMENT METHODS

III Year B.Tech. Mech. Engg. II-Sem   **L T P C**
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Course Objectives:
1. To analyze various engineering objects by deserting them in to small elements.
2. To analyze complicated objects and to find stresses, strains, deflection slopes under various load.
3. To understand potential energy, approach and boundary conditions.
4. To find out stiffness matrix of components to know various parameters objects.
5. To analyze two dimensional elements by using constant strain triangles methods.
6. To analyze one dimensional heat transfer problems like fins and thin plates and to solve Eigen values of stepped bar and beams.

UNIT – I
INTRODUCTION TO FEM
Basic concepts, historical back ground, application of FEM, general description, comparison of FEM with other methods. Basic equations of elasticity, Stress – Strain and strain – displacement relations. Rayleigh – Ritz method, weighted residual methods.
One Dimensional Problems: Stiffness equations for a axial bar element in local coordinates using Potential energy approach and Virtual energy principle – Finite element analysis of uniform, stepped and tapered bars subjected to mechanical and thermal loads – Assembly of Global stiffness matrix and load vector – Quadratic shape functions – properties of stiffness matrix.

UNIT – II
Stiffness equations for a truss bar element oriented in 2D plane – Finite Element Analysis of Trusses – Plane Truss and Space Truss elements – methods of assembly.
Analysis of Beams: Hermite shape functions – Element stiffness matrix – Load vector – Problems.

UNIT – III
2-D PROBLEMS
CST – Stiffness matrix and load vector – Isoparametric element representation – Shape functions – convergence requirements – Problems.
Two dimensional four nodded isoperametric elements – Numerical integration – Finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements – 3-D problems – Tetrahedron element.

UNIT – IV
SCALAR FIELD PROBLEMS
1-D Heat conduction – 1-D fin elements – 2D heat conduction – analysis of thin plates – Composite slabs – problems.

UNIT – V
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. Tirupathi K.Chandrapatla and Ashok D.Belagundu, "Introduction to finite elements in engineering", Mc.Graw Hill, 4th Ed., Oct. 2011, 4th Ed., *ISBN*-13: 978-0132162746.
2. S.S.Rao, "The finite element methods in Engineering", Elsevier, 5th edition, 2012, ISBN-13: 978-1856176613.

Reference Books:
1. J.N.Reddy, "An Introduction to Finite Element Methods", Mc.Grawhill, 2005, 3rd Ed. *ISBN*-13: 978-0072466850.
2. O.C. Zienkowitz, "The Finite Element Method in engineering science", McGrawhill, 2nd Ed., *ISBN*-13: 978-0070941380.
3. S.Md.Jalaludeen, "Introduction of Finite Element Analysis", Anuradha publications, *ISBN*-13: 9788184720983.

Course Outcomes:
The students will be able to
1. Student is able to analyze real time engineering objects and to present a well designed structures.
2. Student can analyze bars beams, shafts and array symmetric solids.
3. Student is able to understand and analyze the heat flow and know the temperature distribution at various points on the components.
4. Student can analyze any complicated structure by utilizing the computer software like ANSYS instead of analytical methods.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96302) REFRIGERATION & AIR CONDITIONING

III Year B.Tech. Mech. Engg. II-Sem

L T P C
4 0 0 4

Course Objectives:
1. Understand the fundamentals, nature and role of refrigeration and air-conditioning. To recognize and understand the different types of air-conditioning systems, equipments and working fluids (refrigerants) used.
2. Understand the working principle of Air refrigeration system, vapour compression refrigeration system.
3. Know the details of components like compressors, condenser, expansion valve and evaporator, refrigerants
4. Understand T-S, p-V, p-h and psychometric chart and able to use these charts in solving practical problems.
5. Know various A.C. equipment like filters, grills, fans, registers and blowers and different heat pump circuits.
6. Know various heat loads to be considered for cooling load calculations and able to design air conditioning system for comfort and industrial applications.

UNIT – I
INTRODUCTION TO REFRIGERATION
Necessity and applications – Unit of refrigeration and C.O.P. – Mechanical Refrigeration – Types of Ideal cycles of refrigeration.
Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems – Actual air refrigeration system problems – Refrigeration needs of Air craft's.

UNIT – II
VAPOR COMPRESSION REFRIGERATION
Working principle and essential components of the plant – simple vapor compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – Actual cycle Influence of various parameters on system performance – Use of p-h charts – numerical problems.
Principles of Evaporators: Classification – Working principles expansion devices – Types – Working principles.
Refrigerants – Desirable properties – classification refrigerants used – Nomenclature – Ozone Depletion – Global Warming.

UNIT – III
VAPOR ABSORPTION SYSTEM
Calculation of max COP – description and working of NH3 – water system and Li Br – water (Two shell & Four shell) System. Principle of operation Three Fluid absorption system, salient features.
Steam Jet Refrigeration System: Working principles and Basic Components, Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube.

UNIT – IV
INTRODUCTION TO AIR CONDITIONING
Psychometric Properties & Processes – Characterization of Sensible and latent heat loads – Need for Ventilation, consideration of infiltration – Load concepts of RSHF, GSHF – Problems, Concept of ESHF and ADP.

Requirements of human comfort and concept of effective temperature – Comfort chart – Comfort Air conditioning – Requirements of Industrial air conditioning, Air conditioning Load calculations.

UNIT – V
AIR CONDITIONING SYSTEMS
Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers, Heat pump – Heat sources – different heat pump circuits.

Text Books:
1. CP Arora, "Refrigeration and Air Conditioning", TMH, 2nd Edition, *ISBN Number*: 978-0074630105.
2. SC Arora & Domkundwa, "A Course in Refrigeration and Air conditioning", Dhanpatrai, *ISBN* : 9780000229663.

Reference Books:
1. P.I. Bellaney, "Refrigeration and Air Conditioning", Jain Book Depot. 2nd Ed., ISBN Number: 817409136X.
2. R.S.Khurmi & J.K.Gupta, "Refrigeration and Air conditioning", S.Chand, Eurasia Publishing House (P) Ltd., 1st Edition, ISBN No. 9788121927819.

Course Outcomes:
Students will be able to:
1. Understand all the basic principles of refrigeration.
2. Prepare a model refrigeration system, using various components according to the requirement.
3. Design an A.C. unit by calculating the heat loads.
4. Observe and analyze large capacity units like ice plants, cold storages and central A.C. units.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96303) DESIGN OF MACHINE MEMBERS – II

III Year B.Tech. Mech. Engg. II-Sem

L T P C
4 0 0 4

Course Objectives:
1. Use references that provide tabulated physical and mechanical data that are useful for mechanical design engineers.
2. Select the material and its properties for the optimum design of a component.
3. Understand the design principles of various machine members
4. Apply the design principles in designing new parts as per its functional requirements.
5. Understand the theories of failures and able to apply them to in defining the failure criteria of the part.
6. Design the various power drives suitable to transfer power requirements.

UNIT – I
BEARINGS

Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings – Clearance ratio – Bearing Characteristic Member, Heat dissipation of bearings, bearing materials – journal bearing design – Ball and roller bearings – Static of ball and roller bearings – One case study

UNIT – II
ENGINE PARTS

Design of cylinder – Piston – Forces acting on piston – Construction Design and proportions of piston. Construction Design and proportions of piston - Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends –Crank shafts, design of overhang crank shaft.

UNIT – III
MECHANICAL SPRINGS

Stresses and deflections of helical springs – Extension and compression springs – Design of springs for fatigue loading – Natural frequency of helical springs – Energy storage capacity – helical torsion springs – Design of co-axial springs, Design of leaf springs – One Case study.

UNIT – IV
GEARS

Spur gears and 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.

UNIT – V
PULLEYS

Transmission of power by Belt and Rope ways, Transmission efficiencies, Belts – Flat and V types.

Design Of Power Screws: Design of screw, design of nut, design of screw jack, compound screw, differential screw, ball screw

Text Books:

1. P.Kannaiah, "Machine Design" Sci-Tech, 4th Ed. 2012, ISBN-13: 978-81-8371-151-7.
2. Pandya and Shah, "Machine Design", Charotar, 18th Ed. 2012, *ISBN*, : 978-93-80358-51-2.

Reference Books:

1. Schaum Series, "Machine deign", Mc.Graw Hill, 1st Edition, ISBN-13: 9780070255951.
2. R.S.Kurmi, J.K.Gupta, "Machine design", S. Chand, 14th Ed, ISBN Number-13: 9788121925372.
3. S.Md.Jalaludeen, "Machine Design", Anuradha Publications, 14th Ed., ISBN-13: 9788189638214.

Course Outcomes:
The students will be able to
1. Design a particular machine element and make use of standards parts and dimensions using design data book.
2. Design journal and roller bearings, engine parts like connecting rod, crank pins, crank shafts, pistons, cylinder and cylinder liner.
3. Design curved beams on T sections, crane hook.
4. Determine Power transmission system.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96304) HEAT TRANSFER

III Year B.Tech. Mech. Engg. II-Sem

L	T	P	C
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Course Objectives:
1. To understand the basic differences between the modes of heat transfers conduction, convention and radiation.
2. To know the basic laws like Fourier's law, Newton's law of cooling and Stefan Boltzmann law: Chart solutions of transient condition system.
3. To understand the concept of hydrodynamic and thermal boundary layers. Heat transfer in phase change like boiling and condensation. Film wise and drop wise condensation.
4. To know various types of heat exchangers and heat transfer coefficients.
5. To know the concepts of log mean temperature difference and NTU methods for heat exchangers.
6. To understand Radiation heat transfer, Planks law, Kirchhoff law, Stefan Boltzmann law, concept of shape factor, black body and emissivity.

UNIT – I
INTRODUCTION

Modes and mechanisms of heat transfer – Basic laws of heat transfer – General discussion about applications of heat transfer. Conduction Heat Transfer: Fourier rate equation – General heat conduction equation in Cartesian, cylindrical and Spherical coordinates.
Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – Initial and boundary conditions.

UNIT – II
CONDUCTION HEAT TRANSFER

One Dimensional Steady State Conduction Heat Transfer: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation. Variable Thermal conductivity – systems with heat sources or Heat generation.
Extended surface (fins) Heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to error measurement of Temperature.
One Dimensional Transient Conduction Heat Transfer: Systems with negligible internal resistance – significance of Biot and Fourier Numbers – Chart solution of transient conduction systems. Concept of Functional Body.

UNIT – III
CONVECTIVE HEAT TRANSFER

Classification of systems based on condition of flow, configuration of flow and medium of flow – Dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem and method, application for developing semi – empirical non-dimensional correlation for convection heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

Forced convection: External Flows: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer – Flat plates and Cylinders.

UNIT – IV
FORCED CONVECTION - INTERNAL FLOWS
Concepts about Hydrodynamic and Thermal Entry Lengths – Division of internal flow based on this – Use of empirical relations of Horizontal Pipe Flow and annulus flow.
Free Convection: Development of Hydrodynamic and Thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates and Pipes.

Heat Transfer with Phase Change: Boiling: Pool boiling – Regimes Calculations on Nucleate boiling, Critical Heat Flux and Film boiling Condensation: Film wise and drop wise condensation – Nusselt's Theory of Condensation on a vertical plate – Film condensation on vertical and horizontal cylinders using empirical correlations

UNIT – V
HEAT EXCHANGERS
Classification of heat exchangers – overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods. Problems using LMTD and NTU methods.

Radiation Heat Transfer: Emission characteristics and laws of black body radiation – Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchhoff, Lambert, Stefan Boltzmann – heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation network.

Text Books:
1. R.C. SACHDEVA, "Fundamentals of Engineering Heat and Mass Transfer", New Age Publishers, 4th Ed. 2010, ISBN : 978-81-224-2785-1.
2. R.K. Rajput, "Heat and Mass Transfer", S. Chand & Company Ltd., 5th Edition, *ISBN Number*: 978-8121926171.

Reference Books:
1. Yunus A.Cengel, "Heat Transfer: A Practical Approach", Tata McGraw Hill (P) Ltd., 4th Ed., ISBN 13: **9780073398129.**
2. F.P Incropera, "Fundamentals of Heat and Mass Transfer", John Wiley & Sons 6th Ed., ISBN-13: 978-0471457282.
3. HOLMAN, "Heat Transfer", TMH 10TH Ed., ISBN Number: 9780071069670.

Course Outcomes:
The students will be able to
1. Design the components like heat exchangers, boilers, condensers, fins etc as per the requirement.
2. Understand the working of the physical components involving steady, unsteady states like refrigeration, electric iron.
3. Design the fins for an electronic component by knowing its heat generation.
4. Design Heat exchangers based on different modes of heat transfer.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96305) AUTOMOBILE ENGINEERING
(ELECTIVE-I)

III Year B.Tech. Mech. Engg. II-Sem   **L   T   P   C**
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Course Objectives:
1. Understand the fundamentals of automobile theory, necessary background for intelligent diagnosis, maintenance and repair of different type of modern automobiles.
2. Learn the components of automobile in detail, power transmission, engine construction and working, lubrication system.
3. Get the idea of emissions that will be released from the automobile
4. Understand different types of fuel systems, cooling and ignition systems.
5. Understand different steering gear mechanisms
6. Gain knowledge of different systems of an automobile like electrical, transmission, suspension and breaking systems.

UNIT – I
INTRODUCTION
Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarburization, Nitriding of crank shaft..
Emission from Automobiles : Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.
Multi point fuel injection for SI engines, CRDI – solor photo – voltaic, hydrogen, bio mass, alcohals , LPG, CNG, Liquid fuels and gaseous fuels, electrical , merits and demerits.

UNIT – II
FUEL SYSTEM
S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – carburetor – types – air filters – petrol injection.
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles   injection timing, testing of fuel, pumps.

UNIT – III
COOLING SYSTEM
Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.
Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

UNIT – IV
ELECTRICAL SYSTEM
Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

Transmission System: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, constant mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles – types – wheels and tyres.

UNIT – V
STEERING SYSTEM
Steering geometry – camber, castor, king pin rake, combined angle toe in, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

Text Books:

1. Kripal Singh, "Automobile Engineering", Vol. 1 & Vol. 2, Standard Publishers Distribution 12th Edition, ISBN Numbers: 9788180141713, 9788180141775.
2. K.M Gupta, "Automobile Engineering", Vol. 1 & Vol. 2, Umesh publication, 1st Edition, 2013, ISBN Numbers: 9788188114220.

Reference Books:

1. Heitner, "Automotive Mechanics", 2nd Ed., CBS Publishers & Distributors, *ISBN*-13: 978-8123908915.
   P. RamiReddy, "Alternative fuels of Automobiles", Frontline publications.

Course Outcomes:
The students will be able to
1. Understand working of engine based upon the principles of 2- stroke, and 4-stroke.
2. Analyze the cooling systems depending upon the cooling requirements for particular automobile.
3. Understand different types of ignition systems used in case of an automobile.
4. Understand various transmission systems, steering systems and suspension and breaking systems.
5. Understand different types of fuel injection system and pump system.
6. Understand the pollution controlling system and their standards.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96601) INDUSTRIAL MANAGEMENT
(ELECTIVE-I)

III Year B.Tech. Mech. Engg. II-Sem

L	T	P	C
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Course Objectives:
This course is intended to familiarize the students with the framework for the managers and leaders available for understanding and making decisions relating to issues related organisational structure, production operations, marketing, Human resource Management, product management and strategy.

UNIT - I:

Introduction to Management and Organization: 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 Product 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. Aryasri: Management Sciences, 2/e, TMH, 2005.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.
3. 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:

By the end of the course, the student will be in a position to
- Plan an organizational structure for a given context in the organisation carry out production operations through Work study.
- Carry out production operations through Work study.
- Understand the markets, customers and competition better and price the given products appropriately.
- Ensure quality for a given product or service.
- Plan and control the HR function better.
- Plan, schedule and control projects through PERT and CPM.
- Evolve a strategy for a business or service organisation.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96306) JET PROPULSION & ROCKET ENGINEERING
(ELECTIVE-I)

III Year B.Tech. Mech. Engg. II-Sem

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Objectives:
- List and explain the characteristics & performance of aerospace propulsion systems.
- Model newly conceived racket or air breathing propulsion systems and estimate their performance and behavior.
- Carry out preliminary designs of rocket to meet specified requirements.
- Air breathing & rocket engines are covered.

UNIT-I
ELEMENTS OF GAS TURBINE THEORY
Thermodynamic cycles, Open closed and semi-closed – parameters of performances – cycle modifications for improvement of performances.

JET PROPULSION
Historical sketch – reaction principle – essential features of propulsion devices – Thermal engines, Classification of – Energy flow thrust, thrust power and propulsion efficiency – Need for thermal jet engines and applications.

UNIT-II
TURBOPROP AND TURBOJET-I
Thermodynamics Cycles, plant layout essential components, principles of operation – performance evaluation

TURBOPROP AND TURBOJET-II
Thrust, Augmentation and thrust reversal – contrasting with piston engine propeller plant.

UNIT-III
RAMJET
Thermodynamic cycle, plant layout, essential components – principle of operation - performance evaluation – comparison among atmospheric thermal jet engines – serquejet an pulsejet, elementary treatment.

ROCKET ENGINES
Need for, applications – Basic principles of operations and parameters of performance classification, solid and liquid propellant rocket engines advantage, domains of application – propellants – comparison of propulsion system.

UNIT-IV
ROCKET TECHNOLOGY I
Flight mechanics, application thrust profiles, acceleration – staging of rockets, need for - feed systems, injectors and expansion nozzles – rocket heat transfer and ablative cooling.

UNIT-V
ROCKET TECHNOLOGY II
Testing & Instrumentation – Need for cryogenics – advanced propulsion systems, elementary treatment of electrical, nuclear and plasma arc propulsion.

Text Books:

1. Gas Dynamics and Space Propulsion by M.C. Ramasamy, Ph.D
2. Gas Turbines Propulsive systems by P.R. Khajuria, S.P Dubey.

References:

1. Gas turbines – V Ganesan
2. Gas turbines / Cohen, Rogers & Sarvana. Mutloo / Addision
3. Rocket propulsion - Sutton

Out Comes:
- The students able to presents aerospace propulsive devices as systems.
- Functional requirements and engineering and environmental limitations.
- Mission analysis, fundamental performance relations & exemplary design solutions are presented.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96105) DISASTER MANAGEMENT
(OPEN ELECTIVE)

III Year B.Tech. II-Sem   **L T P C**
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Course Objectives:
Student will be able to
- Understand the difference between a hazard and disaster
- Know about various disasters and their impacts
- Understand different approaches of disaster risk reduction
- Understand disaster risks in India

UNIT 1 : Understanding Disaster
1. Concept of Disaster
2. Different approaches
3. Concept of Risk
4. Levels of Disasters
5. Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerability
1. Natural and man-made hazards; response time, frequency and forewarning levels of different hazards.
2. Characteristics and damage potential or natural hazards; hazard assessment.
3. Dimensions of vulnerability factors; vulnerability assessment.
4. Vulnerability and disaster risk.
5. Vulnerabilities to flood and earthquake hazards.

UNIT 2 : Disaster Management Mechanism
1. Concepts of risk management and crisis managements.
2. Disaster Management Cycle.
3. Response and Recovery.
4. Development, Prevention, Mitigation and Preparedness.
5. Planning for Relief.

UNIT 3: Capacity Building
1. Capacity Building: Concept.
2. Structural and Nonstructural Measures.
3. Capacity Assessment; Strengthening Capacity for Reducing Risk.
4. Counter-Disaster Resources and their utility in Disaster Management.
5. Legislative Support at the state and national levels.

UNIT 4: Coping with Disaster
1. Coping Strategies; alternative adjustment processes.
2. Changing Concepts of disaster management.
3. Industrial Safety Plan; Safety norms and survival kits.
4. Mass media and disaster management.

UNIT 5: Planning for disaster management
1. Strategies for disaster management planning.
2. Steps for formulating a disaster risk reduction plan.
3. Disaster management Act and Policy in India.
4. Organizational structure for disaster management in India.
5. Preparation of state and district disaster management plans.

Text Books
1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

References
1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.
4. Chakrabarty, U.K. Industrial Disaster Management and Emergency Response, Asian Book Pvt. Ltd., New Delhi 2007.
5. Disaster Management in India, Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. National Policy on Disaster Management, NDMA, New Delhi, 2009
7. Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.
8. District Disaster Management Plan-Model Template, NIDM, New Delhi, 2005.
9. Disaster Management, Future challenge and opportunities, Edited by Jagbir singh, I.K. International publishing home Pvt, Ltd.

Course Outcomes:
After completion of this course, student should be able to
- Acquire the knowledge of disaster Management
- Understand the vulnerability of ecosystem and infrastructure due to a disaster
- Acquire the knowledge of Disaster Management Phases
- Understand the hazard and vulnerability profile of India

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96106) AIR POLLUTION AND CONTROL
(OPEN ELECTIVE)

III B.Tech. II Sem
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Course Objectives:

Student will be able to
- Develop an understanding of Air pollution Concepts
- Develop an understanding of Effects of air pollution
- Develop an understanding of Air pollution Control devices
- Develop an understanding of Air quality monitoring devices

UNIT – I
Air Pollution-Definitions, Scope, Significance and Episodes, Air Pollutants-Classifications-Natural and Artificial-Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT – II
Effects of Airpollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT-III
Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO_x; NO_x; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion.
Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT-IV
Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.
Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.
Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – V
General Methods of Control of NO_x and SO_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.
Air Quality Management – Monitoring of SPM, SO_x; NO_x and CO Emission Standards.

Text books:
1. Air pollution by M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

Reference:
1. Air Pollution and Control Engineering by Noel de Nevers, McGraw Hill, 2000.
2. Environmental Pollution Control Engineering by Rao C.S, Wiley Eastern Limited, India, 1993.
3. Air pollution and control By K.V.S.G. Murali Krishna, Kaushal Publishers. Kakinada.

Course Outcomes:

After completion of this course, student should be able to
- Acquire the knowledge of Air pollution Concepts
- Acquire the knowledge of Effects of air pollution
- Acquire the knowledge of Air pollution Control devices
- Acquire the knowledge of Air quality monitoring devices

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96204) ENERGY STORAGE SYSTEMS
(OPEN ELECTIVE)

III Year B.Tech. II-Sem
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Course Objectives:
- Introduce to the technology of energy storage systems
- Learn about the characteristics of electricity and need of ESS in various applications
- Learn about the various types and features of ESS
- Learn about the practical applications of ESS

UNIT-I: ELECTRICAL ENERGY STORAGE TECHNOLOGIES
Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

UNIT-II: NEEDS FOR ELECTRICAL ENERGY STORAGE
Emerging needs for EES, More renewable energy, less fossil fuel , Smart Grid uses, The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

UNIT-III: FEATURES OF ENERGY STORAGE SYSTEMS
Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES),Electrochemical storage systems , Secondary batteries , Flow batteries, Chemical energy storage , Hydrogen (H2),Synthetic natural gas (SNG).

UNIT-IV: TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS
Electrical storage systems, Double-layer capacitors (DLC) ,Superconducting magnetic energy storage (SMES),Thermal storage systems ,Standards for EES, Technical comparison of EES technologies.

UNIT-V: APPLICATIONS
Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

Course Outcomes:

- Apply the technology to have energy storage system for any electrical Loads
- To save the electrical power in peak time loads using ESS
- To store energy and to avoid the environmental pollution

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96307) NANO TECHNOLOGY
(OPEN ELECTIVE)

III Year B.Tech. II-Sem
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Course Objectives:
1. Understand the fundamentals of Nano theory, necessary background for applications in various industries.
2. Learn the components of Nano materials in detail, and its working in different applications
3. Understand the general scientific concepts required for technology, Apply the concepts in solving engineering problems,
4. Explain scientifically the new developments in engineering and technology, and Get familiarized with the concepts, theories, and technological applications.

Unit-I:
Introduction to nanotechnology: Importance of Nano scale, Nanostructure types, electronic, magnetic, optical Properties of Nano materials, top-down and bottom – up approach to nanostructures.

Unit-II:
Quantum Mechanical phenomenon in nanostructures: Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum Wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).
Carbon Nano Structures: Carbon nanotubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, properties (mechanical, optical and electrical) and applications.

Unit-III:
Fabrication of Nanomaterials: Physical Methods: Inert gas condensation, Arc discharge, RF plasma, plasma arc technique, lon sputtering, Laser ablation, Laser pyrolysis, Molecular beam eqitaxy, Chemical vapour deposition method.

Unit-IV:
Nano Scale characterization techniques: Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD.
Nanodevices and Nanomedicine: Lab on chip for bioanalysis, Core/shell Nanoparticles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

Unit-V:
Nano and molecular electronics: Resonant-Tunneling Structures, single electron tunneling, Single Electron transistors, coulomb blockade, glant magneto resistance, tunneling magneto resistance.

Nanolithography and nanomanipulation: e-beam lithography and SEM based nanolithography and nanomanipulation, lon beam lithography, oxidation and metallization Mask and its application. Deep UV lithography, x-ray based lithography.

Text Books:
1. Charies.P.pode, introduction to nanotechnology, springer publications.
2. Springer Handbook of Nanotechnology-Bharat Bhusan.
3. Phani Kumar, principles of nanotechnology, scitech publications.

References Books:
1. David Ferry "Transport in Nano structures" Cambridge University press 2000.
2. Nanobiotechnology; ed, C.M.Niemeyer, C.A. Mirkin.
3. Nanofabrication towards biomedical application: Techniques, tools, Application and impact-Ed. Challa S., S.R.Kumar, J.H.Carola.
4. Encyclopedia of Nanotechnology-Hari Singh Nalwa
5. Carbon Nanotubes: Properties and Applications- Michael J.O'Connell.
6. S.Dutta "Electron Transport in Mesoscopic systems" Cambridge University press.
7. H.Grabert and M.Devoret "Single charge Tunneling" Plenum press 1992.

Course Outcomes:
The students will be able to
1. Understand the fundamentals of Nanotechnology
2. Know the different classes of nano materials
3. Impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
4. Make the learner familiarize with nanotechnology potentialities.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96308) NON CONVENTIONAL SOURCES OF ENERGY
(OPEN ELECTIVE)

III Year B.Tech. II-Sem
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Course Objectives:
  To make the student
- Introduce to the technology of renewable sources of energy
- Learn about the solar radiation, its applications and radiation measuring instruments
- Learn about the various types of geothermal resources and its applications
- Study the biomass energy resources , bio-mass systems.
- Learn the methods of energy extraction from the wind and oceans Learn to the technology of direct energy conversion methods

UNIT-I – I
PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II
SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III
WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.
BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV
GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.
OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V
DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermoelectric generators, see beck, pettier and joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's,

thermodynamic aspects, selection of fuels and operating conditions.

Text Books:
1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

Reference Books:
1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Solar Energy /Sukhame

Course Outcomes:
At the end of the course, the student will be able to
- Apply the technology to capture the energy from the renewable sources like sun, wind, ocean, biomass, geothermal.
- use different renewable energy sources to produce electrical power minimize the use of conventional energy sources to produce electrical energy
- identify the fact that the conventional energy resources are depleted

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96413) EMBEDDED SYSTEMS & MICRO PROCESSORS
(OPEN ELECTIVE)

III Year B.Tech. II-Sem   **L T P C**
                                                                  4 0 0 4

Course Objectives:
- Ability to understand comprehensively the technologies and techniques underlying in building an embedded solution to a wearable, mobile and portable system.

Unit I: Introduction to Embedded System
Embedded system processor, hardware unit, soft ware embedded into a system, Example of an embedded system, Embedded Design life cycle, Embedded System modeling [flow graphs, FSM, Petri nets], Layers of Embedded Systems.

Unit II: Processor and Memory Organization
Bus Organization, Memory Devices and their Characteristics, Instruction Set Architecture [RISC, CISC], Basic Embedded Processor/Microcontroller Architecture [8051, ARM, DSP, PIC], memory system architecture [cache, virtual, MMU and address translation], DMA, Co-processors and Hardware Accelerators, pipelining.

Unit III: I/O Devices and Networks
I/O Devices[Timers, Counters, Interrupt Controllers, DMA Controllers, A/D and D/A Converters, Displays, Keyboards, Infrared devices], Memory Interfacing, I/O Device Interfacing [GPIB, FIREWIRE, USB, IRDA], Networks for Embedded systems (CAN, I2C, SPI, USB, RS485, RS 232), Wireless Applications [Bluetooth, Zigbee].

Unit IV: Operating Systems
Basic Features of an Operating System, Kernel Features [polled loop system, interrupt driven system, multi rate system], Processes and Threads, Context Switching, Scheduling[RMA, EDF, fault tolerant scheduling], Inter-process Communication, real Time memory management [process stack management, dynamic allocation], I/O[synchronous and asynchronous I/O, Interrupts Handling, Device drivers], RTOS [VxWorks, RT-LINUX].

Unit V: Shell Programming & Kernel Module Programming
Processes – giving more than one command at a time – prioritizing and killing processes – Scheduling Commands – pipes and redirection – regular expression – pattern matching – Scripting using for while, if and other commands. Compiling kernel -Configuring Kernel and compilation, Bootloader and boot process and booting kernel, Kernel code browsers.-Static linking ,dynamic linking of modules-User space - kernel space concepts-System calls - Writing simple modules -Writing Makefiles for modules.

Reference Books:

1. Wayne Wolf "Computers as components: Principles of Embedded Computing System Design" The Morgan Kaufmann Series in Computer Architecture and Design, 2008.
2. Jane W. S., Liu, "Real time systems", Pearson Education, 2000.
3. Raj Kamal, "Embedded systems Architecture, Programming and Design", Second Edition, 2008.
4. Steve Heath, "Embedded Systems Design", EDN Series, 2003.

Course Outcome:

At the end of the course the students will be able to:
- Define an embedded system and compare with general purpose system.
- Appreciate the methods adapted for the development of a typical embedded system.
- Get introduced to RTOS and related mechanisms.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96414) PRINCIPLES OF COMMUNICATION SYSTEMS
(OPEN ELECTIVE)

III Year B.Tech. II-Sem **L T P C**
                              4 0 0 4

Course Objectives:
1. To have understanding about different types of AM Communication systems (Transmitters & Receivers)
2. To study in detail the different types of FM transmitters & Receivers and PM Transmitters and Receivers
3. To gain knowledge about different digital modulation techniques for digital transmission.
4.   To have knowledge about base band transmission ISI and distortion free base band transmission
5. To know the spread spectrum modulation techniques and different multiple access methods.

Unit 1:
Introduction: Communication Systems and types, modulation and multiplexing, Electromagnetic spectrum, Gain, Attenuation and decibels.

Unit 2:
Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

Unit 3:
Telecommunication Systems: Telephones Telephone system, Paging systems, Telephony.
Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

Unit 4:
Satellite Communication: Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems.
Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

Unit 5:
Multiple Access Techniques: FDMA, TDMA, CDMA, Packet Radio techniques-ALOHA, slotted ALOHA.
Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.
Wireless Technologies: Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Text Books:

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Wayne Tomasi, Introduction to data communications and networking, Pearson Education, 2005.

Reference Books:
1. Tarmo Anttalainen, Introduction to Telecommunications Network Engineering, Artech House Telecommunications Library.
2. Theodore Rappaport, Wireless Communications-Principles and practice, Printice Hall, 2002.
3. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
4. Kennady, Davis, Electronic Communications systems, 4e, TMH, 1999.

Course Outcomes:
- Identify various elements, processes, and parameters in telecommunications systems, and describe their functions, effects, and interrelationship
- Design procedure of AM transmission and reception, analyze, measure and evaluate the performance of a telecommunication systems and gains given criteria.
- Understand basic components of digital communication systems.
- Design optimum receivers for digital modulation techniques

Know about deferent error detecting and error correcting codes like block codes, cyclic codes and convolution codes

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96512) DATABASE MANAGEMENT SYSTEMS
(OPEN ELECTIVE)

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

Course Objectives:
This Course provides an emphasis on how to organize, maintain and retrieve information efficiently and effectively from a Database and it presents an introduction to database management systems (DBMS) and relational data model. Also the course introduces the concepts of transactions and transaction processing and the issues and techniques relating to concurrency and recovery in multi-user database environments
.

UNIT-I
Introduction - Database system Applications - Database System versus File Systems - View of Data– Instances and schema - Data Models - Database Languages -DDL-DML - Database Users and Administrator –Transaction Management - Database System Structure-Application Architectures – History of Database Systems.**(Chapter 1:-Refer Pg.No 1-21)**

UNIT-II
Database Design and ER model – Basic concepts - Entity sets and Relationship Sets – Constraints - Keys - Design Issues - Entity-Relationship Diagram- Weak Entity Sets - Extended E-R Features - Designing of an E-R Database Schema-Reduction of an E-R Schema to Tables.
(Chapter 2:-Refer Pg.No 27-68)

UNIT – III
Introduction to the Relational Model – Structure of Relational Databases - Relational Algebra –Relational Calculus – Domain relational Calculus , Touple Relational Calculus - Integrity and Security –Domain Constraints ,Referential Integrity Constraints-Triggers-security and Authorization – SQL- Basic Structure, Set operations ,Aggregate Operations –Null values-Nested Sub queries – Views –Modification of Database- Joined relations ,Data Definition Language, Embedded SQL ,Dynamic SQL. **(Chapter 3:-Refer Pg.No 79-122,Chapter 6:-Refer Pg.No 222-248, Chapter 4:-Refer Pg.No 135-180)**

UNIT – IV
First Normal Form ,Pitfalls in Relational Database Design-Functional Dependencies– Decomposition – Desirable properties of Decomposition – Boyce-Codd Normal Form — Third Normal Form- Fourth Normal Form. Transactions-Transaction Concept- Transaction state- Implementation of atomicity and Durability- Concurrent Executions – Serializability, Recoverability-Implementation of Isolation **(Chapter 7:-Refer Pg.No 257-293,Chapter 15:-Refer Pg.No 565-584)**

UNIT-V
Concurrency Control-Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Dead Lock Handling-Recovery System – Failure

Classification, Storage Structure , Recovery and Atomicity,Log Based recovery ,Shadow Paging, Recovery with concurrent transactions.

Storage and File Structure - File Organization – Organization of records in file - Data Dictionary Storage – Indexing and Hashing – Basic Concepts , Ordered Indices,B+Tree Index files, B- tree index files – Static Hashing – Dynamic Hashing – Comparison of Indexing and Hashing.

Chapter 16:-Refer Pg.No 591-620,Chapter 17:-Refer Pg.No 639-660, Chapter 11:-Refer Pg.No 415-428, Chapter 12:-Refer Pg.No 445-480)

Text Books.
1. Database System Concepts, Silberschatz, Korth , Fourth Edition, McGraw hill (Chapters   1,2 excluding 2.10,3,4 excluding 4.8,4.14,6 excluding 6.6, 6.7,7 excluding 7.9, 7.10,11 excluding 11.1 to 11.5,12 excluding 12.8, 12.9, 15 excluding 15.8, 15.9, 16 excluding 16.5, 16.7, 17 excluding 17.7 to 17.10).

References:

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Database Management Systems, Raghuramakrishnan, Johannes Gehrke, TATA Mc Graw Hill
3. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

Course Outcomes:
* A strong foundation in core Computer Science and Engineering, both theoretical and
* applied concepts.
* An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
* Ability to model, understand, and develop complex software for system software as well as application software.
* An ability to communicate effectively, both in writing and oral.
* The broad education necessary to understand the impact of computer science and engineering solutions in the scientific, societal and human contexts
* A recognition of the need for, and an ability to engage in life-long learning
* A knowledge of contemporary issues.

Learning Outcomes
1. Ability to understand the fundamental concepts of database management.
2. Ability to design and query databases, as well as understand the internals of databases.
3. Ability to define basic functions of DBMS & RDBMS.
4. Ability to describe database development process and to apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.
5. Ability to analyze database models & entity relationship models and to draw the E-R diagram for the given case study.
6. Ability to use Structured Query Language (SQL) with complex queries.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96513) JAVA PROGRAMMING
(OPEN ELECTIVE)

III Year B. Tech II Sem   **L T P C**
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Course Objectives:

Modern Computerization methods have matured in the problem solving aspects and presently use the concepts of object oriented treatment of issues. Data sets are used with more functional aspects using the concept of classes and objects with a distinct programming methodology which has become predominant. Many other important software development techniques are based upon the fundamental ideas employed in object-oriented programming. The CSE students are already exposed to preliminaries using C++. Now this course introduces Java and OOPs programming at a higher platform.

UNIT-I
OOP Concepts: Data Abstraction, Encapsulation, Inheritance, Benefits of inheritance, Polymorphism, Classes and Objects, Procedural and Object oriented Programming paradigms.
Java Programming: History of Java, Comments, Data Types, Variables, Constants, Scope and Life Time of Variable, Operators, Operator Hierarchy, Expressions, Type Conversion and Casting, Enumerated Types, Control Flow-Block Scope, Conditional Statements, loops, break, continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and Constructors, recursion, garbage collection, Nested Classes, Inner Classes.
(Text Book-1, Page Number:3-159)

UNIT-II
Inheritance: Inheritance hierarchies super and sub classes, Member access rules, super keyword, and method over riding, preventing Inheritance: final classes and methods, the Object class and its methods.
Interfaces- Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.
Packages- Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing Packages.
(TetBook-1, Page Numbers:161-205).

UNIT-III
Exception Handling- Dealing with Errors, benefits of Exception Handling, the classification of exceptions-exception Hierarchy, checked exceptions and unchecked exceptions, Usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.(TextBook-1: PageNumber:207-225)
Files- streams-byte streams, character streams, text Input/output, binary input/output random access file operations, File management using File class, exploring String Class.

UNIT-IV
Collection Framework in Java- Introduction to Java Collections, Overview of Java Collection Frame work, Generics, Commonly used Collection classes-Array List, Vector,

Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties.(TextBook-1 PageNumbers: 453-492).

Multi Threading- Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern. (TextBook-1 PageNumbers: 227-249).

UNIT-V

GUI Programming with Java- The AWT class Hierarchy, Introduction to Swing, Swing vs. AWT. Introduction to Swing, Swing vs. AWT, Hierarchy for Swing Components, Containers- JFrame, JApplet, JDialog, JPanel, Overview of some swing components-JButton, JLabel, JTextField, JTextArea, simple swing applications.

Applets: Inheritance hierarchy for applets, differences between applets and applications, Life Cycle of an applet,passing parameters to applets, applet security issues. (TextBook-1 PageNumbers: 687-706).

Text Books:
1. Java The Complete Reference, 8th Edition. Hebert Schildt. Indian edition.

Reference Books:
1. Java for Programmers, P.J. Dietel and H.M Dietel,Peearson Education (OR) JAVA: How to Program P.J. Dietel and H.M. Dietel, PHI.
2. Object Oriented Programming through Java, P. Radha Krishna, University Press.
3. Thinking in Java, Bruce Ecel, Pearson Education
4. Programming in Java, S. Malhotra and S. Choudary, Oxford Univ. Press.

Course Outcomes (COs):
Following are the course outcomes that we attain:
- A strong foundation in core computer science and engineering, both theoretical and applied concepts.
- An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
- Ability to model, understand, and develop complex software for system software as well as application software.
- An ability to function effectively within teams
- An ability to communicate effectively, both in writing and oral.
- The broad education necessary to understand the impact of computer science and engineering solutions in the scientific, societal and human contexts

Learning Outcomes (LOs):
Upon successful completion of this course, students would be able to learn:
1. **Knowledge:** They can describe the principles of object-oriented programming, apply the concepts of data encapsulation, inheritance, and polymorphism to large-scale software and also acquire the concepts of Graphical User Interfaces.
2. **Professional Skill:** They can Design and develop object-oriented computer programs apart from that they can develop programs with Graphical User Interfaces capabilities.
3. **Transferable Skill:** They can formulate problems as steps so as to be solved systematically.
4. **Attitude:** They can integrate robustness, reusability, and portability into large-scale software development with team-work in mind.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96309) HEAT TRANSFER LABORATORY

III Year B.Tech. Mech. Engg. II-Sem

L T P C
0 0 3 2

Course Objectives:
1. To know about various measuring instruments Thermocouples, Voltmeter, Ammeter, etc. To demonstrate experimental principles.
2. To explain basic heat transfer principles. To determine thermal conductivity of various materials like magnesium oxide, brass rod, asbestos, saw dust.
3. To perform experiments on Cartesian, cylindrical and spherical coordinate system experiments separately.
4. To determine the overall heat transfer coefficient in composite walls and heat exchanger.
5. To know the efficiency, temperature distribution of a pin fin. To understand a black body and know emissivity any other gray body.

Perform any 10 out of the 12 exercises:

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 unsteady state Heat Conduction
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection
9. Parallel and counter flow heat exchanger.
10. Emissivity measurement apparatus.
11. Stefan Boltzmann Apparatus.
12. Critical Heat flux apparatus

Text Books:
1. HOLMAN, "Heat Transfer", TMH, 10th Ed. 2011, ISBN Number: 9780071069670.
2. P.K. Nag, "Heat Transfer", TMH, 3rd Ed., 2011

Reference Books:
1. R.C. SACHDEVA, "Fundamentals of Engg. Heat and Mass Transfer", New Age International 4th Ed., ISBN : 978-81-224-2785-1.
2. Ghoshdastidar, "Heat Transfer", Oxford University Press, H Edition, 2nd Ed., April. 2012.
3. F.P Incropera, "Fundamentals of Heat and Mass Transfer", John Wiley & Sons, 6th Ed., ISBN-13: 978-0471457282.
4. R.K. Rajput, "Heat and Mass Transfer", S. Chand & Company Ltd., *ISBN Number*: 978-8121926171.

Course Outcomes:

The students will be able to

1. Student is able to analyze and conduct the experiments to know the heat transfer and temperatures.
2. Student is able to interpret the experimental knowledge in the real life situation like in, electric iron, and refrigerator.
3. Student is able to possess the application knowledge of engine radiation, air condition chambers, solar collectors, engine radiators etc.
4. Student can design a heat transfer system to cool the given component to required temperature within the desired time.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A96001) ADVANCED ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

III Year B.Tech. II-Sem

L	T	P	C
0	0	3	2

Introduction:
The introduction of the Technical Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

* Gathering ideas and information to organize ideas relevantly and coherently.
* Engaging in debates.
* Participating in group discussions.
* Facing interviews.
* Writing project/research reports/technical reports.
* Making oral presentations.
* Writing formal letters.
* Transferring information from non-verbal to verbal texts and vice-versa.
* Taking part in social and professional communication.

Course Objectives:
This Lab focuses on using multi-media instruction for language development to meet the following targets:

* To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
* Further, they would be required to communicate their ideas relevantly and coherently in writing.
* To prepare all the students for their placements.

Syllabus:
The following course content to conduct the activities is prescribed for the Technical Communication Skills (TCS) Lab:

1. **Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations and Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations and usage of vocabulary.

2. **Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

3. **Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.

4. **Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.

5. **Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference and video-conference and Mock Interviews.

4. Minimum Requirement:
The Technical Communication Skills (TCS) Laboratory shall have the following infra- structural facilities to accommodate at least 35 students in the lab:
- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. Prescribed Lab Manual: A book titled *A Course Book of Advanced Communication Skills (ACS) Lab* published by Universities Press, Hyderabad.
6. Suggested Software:
The software consisting of the prescribed topics elaborated above should be procured and used.
- **Oxford Advanced Learner's Compass**, 8th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Preparing for being Interviewed**
  - **Positive Thinking**
  - **Interviewing Skills**
  - **Telephone Skills**
  - **Time Management**
  - **Skillmate**
  - **Presentation skills, Cambridge** (with VCD)
7. Books Prescribed:
1. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

2. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
3. **Advanced Communication Skills Laboratory Manual** by Sudha Rani, D, Pearson Education 2011.
4. **Technical Communication** by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. **Business and Professional Communication:** Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.

Suggested Books:

1. **The Basics of Communication: A Relational Perspective**. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
2. **English Vocabulary in Use** series, Cambridge University Press 2008.
3. **Management Shapers Series** by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
4. **Handbook for Technical Communication** by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
5. **Communication Skills** by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
6. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
7. **Job Hunting** by Colm Downes, Cambridge University Press 2008.
8. **Master Public Speaking** by Anne Nicholls, JAICO Publishing House, 2006.
9. **English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.**
10. Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press.
11. **International English for Call Centres** by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.
12. **Towards Career Advancement** - Excerpts from a Professor's Folio by **P. Satyanarayana Prof. of English, Vaagdevi College of Engineering** , published by Vaagdevi Group of Colleges Engineering , Warangal (T.S.) India, 2015.

Course Outcomes
• Developing sound vocabulary and its proper use contextually.
• Inculcating flair for Writing and felicity in written expression.
• Enhancing job prospects.
• Acquiring effective speaking abilities

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97301)POWER PLANT ENGINEERING

IV Year B.Tech. Mech. Engg. I-Sem

	L	T	P	C
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COURSE OBJECTIVES:
1. Understand the sources of energy, nature and role of energy in India. To recognize and understand the different types of power plants, equipments and Layouts
2. Understand the working principle of Steam power plant, equipment, Coal handling systems, ash handling systems.
3. Understand working principle of Diesel power plant and Gas Turbine power plant .
4. Know components of Hydro-Electric Power plant ,Typical Layouts, Types of Dams
5. Know various nuclear fuels, various types of Nuclear Reactors.
6. Understand Power plant Economics, Load Curves, Effluents from various power plants, Environmental standards

UNIT – I
INTRODUCTION TO THE SOURCES OF ENERGY
Resources and Development of Power in India.
Steam Power Plant: Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage. Ash handling systems.
Steam Power Plant: Combustion process: Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction. Dust collectors, cooling towers and heat rejection. Corrosion and fed water treatment.

UNIT – II
INTERNAL COMBUSTION ENGINE PLANT
DIESEL POWER PLANT: Introduction – IC Engines, types, construction – Plant layout with auxiliaries.
Gas Turbine Plant: Introduction – classification – construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparison.

UNIT – III
HYDRO ELECTRIC POWER PLANT
Water power – Hydrological cycle/flow measurement – drainage area characteristics – Hydrographs – storage and Pond gage – classification of dams and spill ways.
Hydro Projects and Plant: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT – IV
NUCLEAR POWER STATION
Nuclear fuel – breeding and fertile materials – Nuclear reactor – reactor operation.
Types of Reactors: Pressurized water reactor, Boiling water reactor, sodium-graphite reactor, fast Breeder Reactor, Homogeneous reactor, Gas cooled reactor, Radiation hazards and shielding – radioactive waste disposal.
Introduction to alternate energy sources.

UNIT – V
POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS
Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution. Load curves, load duration curve. Definitions of connected load. Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – Pollutants and pollution standards – Methods of Pollution control.

TEXT BOOKS
1. P.C.Sharma, "Power Plant Engineering", S.K.Kataria Publication, 2013, ISBN-13: 9788189757205.
2. Arora and S.Domkundwar, "A course in Power Plant Engineering", 2nd Edition TMH, *ISBN:* 9780070435995.

REFERENCE BOOKS
1. Rajput, "A text book of Power Plant Engineering", Laxmi Publications, ISBN No.: 978-81-318-0255-7.
2. Ramalingam, "Power Plant Engineering", SciTech Publishers, ISBN-13: 9788183710626.
3. P.K.Nag, "Power Plant Engineering": II Edition, TMH, *ISBN* Number: 978-0070648159.
4. Elanchezhian, "Power Plant Engineering", I.K. International Publications, *ISBN*-13: 978-8189866303.

COURSE OUTCOMES:
This course helps the students to
1. Understand the layout of power generation units for different energy sectors.
2. An ability to identify different subsystem and systems of power generation sector.
3. Broad Exposure to existing and emerging alternative energy sources
4. Exploring the opportunities in contributing towards the solving of energy crisis.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97302)CAD/CAM

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
1. To know the computers in industrial manufacturing and use of hardware and software components in CAD/CAM systems.
2. To analyze the difference between 2D & 3D transformations in computer graphics applications.
3. To construct the database models and geometric modeling features. To know the drafting and modeling systems used in CD/CAM. Solid modeling features and applications.
4. To distinguish between NC (Numerical Control), CNC & DNC in CAD/CAM.
5. To know about   the group technology approaches for manufactories industries.
6. To analyze the QC (Quality Control) and CAQC (Computer Aided Quality Control) functions

UNIT – I
COMPUTERS IN INDUSTRIAL MANUFACTURING
Product cycle, CAD/CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.
Computer Graphics: Virtual reality, Hidden lines, Hidden surfaces, Z-buffer, Pointers, Area sub-division, Scan line algorithm. , database structure for graphics, modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping,

UNIT – II
GEOMETRIC MODELING
Requirements, geometric models, geometric construction models, curve representation methods-Hermite Cubic spline, Bezier curve, B-spline
 Surface representation methods-Plane Surface, Surface of evaluation, tabulated cylinder.
Solid modeling-Boundary representation, Constructive solid geometry
Drafting and Modeling Systems: Basic geometric commands, layers, display control commands, editing, dimensioning,

UNIT – III
NUMERICAL CONTROL
NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, computer aided part programming.

UNIT – IV
GROUP TECHNOLOGY
Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods- Non-optical, computer aided testing, integration of CAQC with CAD/CAM.

UNIT – V
COMPUTER AIDED PROCESS PLANNING
Retrieval CAPP, Generative CAPP, Hybrid system
Case Studies- Web Integrated Manufacturing, JIT production control by Kanban, Toyota integrated product development, Indian Manufacturing Scenario

TEXT BOOKS:
1. A Zimmers & P.Groover, "CAD/AM", PE/PHI, 1st Ed., *ISBN Number*: 978-8177584165.
2. Ibrahim Zeid, "CAD/CAM Theory and Practice", TMH, 2nd Ed., *ISBN Number*: 978-0070151345.

REFERENCE BOOKS:
1. Lalit Narayan, "Computer Aided Design and Manufacturing", PHI, ISBN: 978-81-203-3342-0.
2. Radhakrishnan and Subramanian, "CAD/CAM/CIM", New Age, 3rd Ed., 2007, ISBN-13: 9788122412482.

COURSE OUTCOMES:
The students will be able to
1. Observe the various input and output devices used in CAD/CAM systems.
2. Understand 2D and 3D transformations problems can be assigned to students.
3. Write the programs for different models by using NC part programming.
4. Analyze the Group Technology (GT), CAQC (Computer Aided Quality Control) and CIM (Computer Integrated Manufacturing) systems.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97303)UNCONVENTIONAL MACHINING PROCESS

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
1. To understand the difference between convention and unconventional machining process. To know the modern machining process and process selection for different materials.
2. To know the Metal Removal Rate and surface finish of different materials using different process parameters.
3. To know the electro chemical machining process, elements of ECM process, concentration, working of tool, chemistry of the process and tool design.
4. To know the economic aspects of the different unconventional machining process.
5. To know the basic principle of electric discharge machining process, power circuits for EDM   process   tool design, surface finish, machining accuracy and characteristics of spark evaded surface wire process
6. To know the metallurgical effects of surface after machining process.

UNIT – I
INTRODUCTION
Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection. Materials. Applications.
Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT – II
ABRASIVE JET MACHINING
Water jet machining and abrasive water jet machine. Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.
Electro – Chemical Processes : Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy economic aspects of ECM – Simple problems for estimation of metal removal rate. Fundamentals of chemical, machining, advantages and applications.

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

UNIT – IV
GENERATION AND CONTROL OF ELECTRON BEAM FOR MACHINING
Theory of electron beam machining, comparison of thermal and non-thermal processes – General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT – V
APPLICATION OF PLASMA FOR MACHINING
Metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries. Chemical machining-principle- maskants –etchants- applications.
Magnetic abrasive finishing, Abrasive flow finishing, Electro stream drilling, shaped tube electrolytic machining.

TEXT BOOKS:
1. Pandey P.C. and Shah H.S., "Modern Machining Process", TMH., 2008, 1st Edition, *ISBN*:9780070965539.
2. Serope Kalpakjian and Steven R.Schmid, "Manufacturing Engineering and Technology", Pearson Publications, 5th Ed. 2009, *ISBN*: 0132272717.

REFERENCE BOOKS:
1. V.K.Jain, "Advanced Manufacturing Process", Allied publishers, Edition: 2012, ISBN-13: 978-1439852903.
2. Bhattacharya A, "New Technology", The Institution of Engineers, India 1984.
3. C.Elanchezhian, B.Vijaya Ramnath and M.Vijayan, "Unconventional Machining Processes", Anuradha Publications, 2005, *ISBN* Number: 9788120319585.

COURSE OUTCOMES:
The students will be able to
1. Understand selection of processes.
2. Design the components of Abrasive Jet machining process.
3. Observe surface properties after machining without destructing the material.
4. Select the material with respect to process.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97304)CNC TECHNOLOGY
(ELECTIVE-1I)

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
1. Understand basic features of NC and CNC Machines and their Design Considerations.
2. To study various system devices hardware and software interpolations.
3. To Know various tooling systems used in CNC Machines.
4. Understand both Manual and Computer Aided Programming for Generating Various Contours.
5. To study about the DNC systems and Adaptive Control used for various machining process.

UNIT-1:
Features of NC Machines, Fundamentals of numerical control, advantage of NC systems, classification of NC systems, point to point, NC and CNC, incremental and absolute, open and closed loop systems, F Features of NC Machine Tools, design consideration of NC machine tool, methods of improving machine accuracy.

UNIT-1I:
CNC Machines Elements: Machine Structure-Guide ways-feed drives-spindles-spindle bearings.
System Devices: Drives, feedback devices, counting devices.
Interpolators for manufacturing systems: DDA integrator, DDA hardware interpolators, CNC software interpolators.

UNIT-III:
Tooling for CNC Machines: Interchangeable tooling system, preset and qualified tools, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers.

UNIT-IV:
NC Part Programming: Manual programming – Basic concepts, Point contour programming, canned cycles, parametric programming.
Computer-Aided Programming: General information, APT programming, Examples APT programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors. Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT-V:
DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages and disadvantages of DNC adaptive control with optimization, Adaptive control with constraints, Adaptive control of machining processes like turning, grinding.

TEXT BOOKS:
1. Computer Control of Manufacturing Systems- Yoram Koren, Tata Mc Grw Hill, 2009.
2. Computer Aided Manufacturing-Elancheqhian, Sunder Selvan and Shanmuga Sunder, University Science Press, Second Edition.

REFERENCES BOOKS:
1. Machiniing Tools Hand Book Vol 3. (Automation & Control) Manfred Wek/ John Wiley and Sons, 1984.
2. Mechatronics – HMT, TMH.
3. Computer Numerical Control –Operations and Programming – Jon Stenerson and Kelly Curron Pul, 3rd Edition.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97001) OPERATIONS RESEARCH
(ELECTIVE-1I)

IV Year B.Tech. Mech. Engg. I-Sem　　　　　　　　　　　　　　**L　T　P　C**

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COURSE OBJECTIVES:

　　　　The present course enable students to learn various concepts in programming problems like classical, linear programming and also it provides mathematical and statistical concepts like transportation problem, assignment problem, sequencing problem it helps the students to gain knowledge in terms of game theory and strategies which is useful in many industrial, engineering and business activity courses.

UNIT – I

Linear programming: Linear Programming problems – Solution – feasible solutions – optimum solution – Feasible region – Graphical method – Simplex method.

UNIT – II

Transportation problems: Introduction – Mathematical formation of T.P – Existence of solution – in T.P. – Initial basic feasible solution – N.W corner rule – Least cost method – Vogel's approximation method – Test for optimality – MODI method – Degeneracy in T.P – unbounded Transportation problems.

UNIT – III

Assignment problems: Mathematical formulation Hungarian Assignment method – Maximum case in Assignment – Prohibited Assignments – Travelling salesmen problems.

UNIT – IV

Sequencing problems: Problems of sequencing – Basic terms used in sequencing –
Processing of n-jobs through two machines – Optimum sequencing Algorithm – Processing of n-jobs through k-machines.

UNIT – V

Games & Strategies: Introduction – Two person zero sum game – Maximin-Minimax principle – Games without Saddle points – Mixed strategies – Graphical solution of 2 X n and m X 2 games – Rectangular games by using dominance principle.

TEXT BOOKS:

1. Engineering optimization. Theory and practice" S. S.Rao, New Age International (P) Limited.
2. Optimization Methods in Operations Research and systems Analysis, K.V. Mittal and C. Mohan, New Age International (P) Limited.

REFERENCE BOOKS:

1. Operations Research, Dr. S.D.Sharma.
2. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt .Ltd.
3. Operations Research: An Introduction, H.A.Taha, Pearson Pvt. Ltd.
4. Operations Research, Richard Bronson, Govindasami Naadimuthu, Tata Mc Graw - Hill Company Limited.

COURSE OUTCOMES:

By studying Operations Research students are able to find out the optimization solutions through graphical procedures. Important statistical concepts like transportation, assignment, sequencing and game theory strategies. Which gives very good insight and essential real world problems solutions and its applications for the student community.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97305) DESIGN FOR MANUFACTURING
(ELECTIVE-II)

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
- To understand various general design rules for manufacturability and criteria for material selection.
- To study various machining process and tolerance aspects in machining.
- To know the design considerations for casting and welding process.
- To understand the conceptual design factors to be considered in forging extrusion and sheet metal work.
- To study the general design guidelines for manual assembly and development of DFA Methodology.

UNIT-1:
Introduction: Design philosophy-Steps in Design process – General Design rules for Manufacturability – Basic principles of designing for economical production – Creativity in design.
Materials: Selection of Materials for design- Developments in Material Technology – Criteria for material section – Material selection interrelationship with process selection – process selection charts.

UNIT-I1:
Machining Process: Overview of various machining process – general design rules for machining – Dimensional tolerance and surface roughness – Design for Machining ease – Redesigning of components for machining ease with suitable examples, General design recommendations for machined parts.

UNIT-1II:
Metal Casting: Appraisal of various casting processes, general design considerations for casting – casting tolerances – Use of Solidification Simulation in casting design – Product design rules for sand casting.
Metal Joining: Appraisal of various welding processes, Factors in design of weldments – General design guidelines – pre and post treatment of welds – Effects of thermal stresses in weld joints – Design of brazed joints.

UNIT-IV:
Forging: factors for forging – Closed die forging design – parting lines of dies – Drop forging die design – General design recommendations Extrusion, Sheet Metal Work Design guidelines for Extuded sections – Design principles for Punching. Blanking, Bending, Deep Drawing-Keeler Goodman Forming Limit Diagram – Component Design for Blanking.

UNIT-V:
Design for Assembly: General design guidelines for Manual Assembly – Development of Systematic DFA Methodology – Assembly Efficiency – Classification System for Manual insertion and Fastening – Effect of part symmetry on handling time.

TEXT BOOKS:
1. Product design for Manufacture and Assembly – Geoffrey Bothroyd, Peter Dewhurst and W.A Knight, CRC Press.

REFERENCES BOOKS:
1. Product design and Manufacturing – A.K Chitable and R.C Gupta. Prentice – Hall of India, New Delhi, 2003.
2. Design and Manufacturing – Surender Kumar & Goutham Sutradhar, Oxford & IBH Publishing Co. Pvt Ltd., New Delhi, 1998.
3. Product Design – Kevin Otto and Kristin Wood. Pearson Education.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97306) ROBOTICS
(ELECTIVE – III)

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
1. Students will be able to understand the concepts of robotics – classification by coordinate system and control system.
2. Students will able to determine the degrees of freedom, end effectors, electric hydraulic and pneumatic devices.
3. Students will possess the concepts of homogeneous transformations.
4. Student will understand the Jacobeans problems, Newton – Euler formations.
5. Students will know about the actuators and feedback components, resolvers, encoders - velocity sensors.
6. Students will able to know the applications of robots in manufacturing.

UNIT – I
INTRODUCTION
Automation and Robotics – An over view of Robotics – classification by coordinate system and control systems – Components of the Industrial Robotics: Degrees of freedom – End effectors: Mechanical gripper – Magnetic – Vacuum cup and other types of grippers – General consideration on gripper selection and design

UNIT – II
MOTION ANALYSIS
Basic rotation matrices – Composite rotation matrices – Euler Angles – Equivalent Angle and Axis – Homogeneous transformation – Problems.
Manipulator Kinematics: D.H.Notations – Joint coordinates and world coordinates – Forward and inverse kinematics – problems.
Differential Kinematics: Differential kinematics of planar and spherical manipulators – Jacobians – Problems.

UNIT – III
ROBOT DYNAMICS
Lagrange – Euler formulations – Newton – Euler formulations – Problems on planar two link manipulators.

UNIT – IV
TRAJECTORY PLANNING
Joint space scheme – cubic polynomial fit – Avoidance of obstacles – Types of motion – Slow motion – Joint interpolated motion – straight line motion – problems.

UNIT – V
ROBOT ACTUATORS AND FED BACK COMPONENTS
Actuators: Pneumatic and Hydraulic actuators. Electric Actuators: DC servo motors – stepper motors. Feedback components: position sensors – potentiometers, resolvers and encoders – Velocity sensors – Tactile sensors.
Robot Application in Manufacturing: Material handling – Assembly and Inspection.

TEXT BOOKS:
1. Groover M P, "Industrial Robotics", Pearson Edu., 2012 1st Edition, *ISBN Number*: 0070265097, 9780070265097, 978-0070265097.
2. JJ Craig, "Introduction to Robotic Mechanics and Control", Pearson, 2008 3rd edition. ISBN-13: 978-0201543612

REFERENCE BOOKS:
1. Fu K S, "Robotics", McGraw Hill, 1st Ed., 2008, ISBN 13: **9780070226258.**
2. Richard D.Klafter, "Robotic Engineering", Prentice Hall, 1st Ed., 1989, ISBN-13: *9780137820535.*

COURSE OUTCOMES:
The students will be able to
1. Apply the knowledge of robotics in real time human life applications.
2. Implement the concept of CAD/CAM and automation to the robotics.
3. Gain knowledge of robot applications in manufacturing like, material handling, loading and unloading etc.
4. Apply the robotics to the spot and continuous arc welding and spray painting.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97307)MECHANICAL VIBRATIONS
(ELECTIVE-I1I)

IV Year B.Tech. Mech. Engg. I-Sem   **L T P C**

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COURSE OBJECTIVES:

Students will be able to

i) Fully understand and appreciate the importance of vibrations in mechanical design of machine parts
ii) Able to make free and forced (harmonic, periodic vibrations)
iii) Solve for the motion and the natural frequency of freely vibrating damped and undamped motion.
iv) Will be able to know about free and forced vibrations with damping of linear systems with one and two degrees of freedom.

UNIT-1:
Single Degree of Freedom Systems: Undamped and damped free vibrations; forced vibrations coulomb damping; Response to excitation; rotating unbalance and support excitation; vibration isolation and transmissibility – Response to Non Periodic Excitations: unit impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution integral; shock spectrum; System response by the Laplace Transformation method.

UNIT-I1:
Two Degree Freedom Systems: Principal modes – Undamped and damped free and forced vibrations, undamped vibration absorbers.

UNIT-1II:
Multi Degree Freedom Systems: Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Tensional vibrations of multi – rotor systems and geared systems; Discrete – Time systems.
Vibration measuring instruments: Vibrometer, velocity meters & accelerometers.

UNIT-1V:
Frequency Domain Vibration Analysis; Over view, machine train monitoring parameters - Data base development – vibration data acquisition-trending analysis-failure-node analysis-signature analysis-root cause analysis.

UNIT-V:
Numerical Methods: Raleigh's stodola's, Matrix iteration, Rayleigh – Ritz Method and Holzer's methods.

TEXT BOOKS:

1. Mechanical Vibrations/Groover/Nem Chand and Bros.
2. Elements of Vibration Analysis/Meirovitch/TMH, 2001

REFERENCES BOOKS:

1. Mechanical Vibrations/VP Singh/Danapathi Raj & Sons.
2. Mechanical Vibrations/SS Rao/Pearson, 2009/4th Edition.
3. Mechanical Vibrations/Debabrata Nag/Wiley.
4. Vibration problems in Engineering/S.P.Timoshenko.
5. Mechanical Vibrations and sound engineering/A.G.Ambekar/PHI.
6. Theory and Practice of Mechanical Vibrations/JS Rao & K.Gupta/ New Age Intl. publishers/Revised 2nd Edition.

COURSE OUTCOMES:

i) Students acquire the ability to i) format mathematical modes of problems in vibrations
ii) Students will have an abilities to obtain the complete solution for the motion of vibrators system (damped & undamped subjected to non periodic forcing functions)
iii) Students will be able to obtain design parameters and indicate methods of solutions for complicatory vibratory problems

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97308)AUTOMATION IN MANUFACTURING
(ELECTIVE – III)

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:
1. Understand the types and strategies of automation, automated flow lines.
2. Understand different types of circuits and tool changing methods.
3. Understand the transfer lines, buffer storage, assembly lines
4. Know the material handling systems, conveyor systems, automated guided vehicle systems
5. Know Adaptive control, Application of A.C. in machining operations.
6. Know the principles of ERP, BPE, Concurrent Engineering, and Rapid Proto Typing.

UNIT – I
INTRODUCTION
Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and tool changing and machine tool control transfer the automaton.
Automated flow lines: Methods or work part transport, transfer, Mechanical buffer storage control function, design and fabrication consideration.

UNIT – II
ANALYSIS OF AUTOMATED FLOW LINES
General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.
Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – III
AUTOMATED MATERIAL HANDLING
Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.
Automated storage systems, automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – IV
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.

UNIT – V
BUSINESS PROCESS RE-ENGINEERING
Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Proto typing.

TEXT BOOKS:
1. Groover, "Automation, Production Systems and Computer Integrated Manufacturing: M.P.", PE/PHI, 3rd Edition, *ISBN*: 0132393212.
2. Yoram Coreom, "Computer control of Manufacturing Systems", *ISBN*: 0070353417.

REFERENCE BOOKS:
1. P.Radhakrishnan & S.Subrahamanyarn and Raju, "CAD / CAM/ CIM", New Age International Publishers, 3rd Edition, 2003, ISBN 13: 9788122422368.
2. Singh, "Approach to Computer Integrated Design and Manufacturing", John Wiley 1996, *ISBN*: 978-0-471-58517-6.

COURSE OUTCOMES:
This course helps the students to
1. Get complete idea about necessity of automating any industry and procedure to be adopted for automation.
2. Learn about different types of automated flow lines, transfer lines.
3. Get command over all types of material handling systems and adaptive control systems.
4. Conceptualize about the packages available for advanced techniques available in mechanical engineering.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97309) CAD/CAM LABORATORY

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
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COURSE OBJECTIVES:
1. To know the part drawings for various components.
2. To draw the part modeling using AutoCAD software package.
3. To determine the deflection and stresses in 2D and 3D trusses and beams by using ANSYS package.
4. To develop different modeling components using pro-E.
5. To develop the NC program for CNC milling and turning operations by using CADEM package
6. To get the idea of post processors used in NC machines.

CAD / CAM LAB:
1. Drafting: Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances.

2. Part Modeling: Generation of various 3D Models through protrusion, revolve, shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling surface and Assembly Modeling. Study of various standard Translators. Design simple components.
3. a) Determination of deflection and stresses in 2D and 3D trusses and beams.
   b) Determination of deflections component and principal and von-misses stresses in plane stress, plane strain and axi symmetric components.
   c) Determination of stresses in 3D and shell structures (at least one example in each case)
   d) Estimation of natural frequencies and mode shapes Harmonic response of 2D beam.
   e) Steady state heat transfer Analysis of plane and Axisymmetric components.

4. a) Development of process sheets for various components based on tooling machines.
   b) Development of manufacturing and tool management systems.
   c) Study of various post processors used in NC Machines
   d) Development of NC code for free form and sculptured surfaces using CAM packages.
   e) Machining of simple components on NC lathe and Mill by transferring NC code / from a CAM package.
   f) Quality Control and inspection.

SOFTWARE PACKAGES REQUIRED:
Use of Auto CAD, Pro-E, ANSYS, CNC train offline simulation software

TEXT BOOKS:
1. Zimmers & P.Groover, "CAD/CAM", APE/PHI 1st Ed., *ISBN Number*: 978-8177584165.
2. Ibrahim Zeid, "CAD/CAM Theory and Practice", TMH 2nd Ed., *ISBN Number*: 978-0070151345.

REFERENCE BOOKS:
1. Groover, "Automation, Production systems & Computer integrated Manufacturing", Pearson Education, 3rd Edition, *and ISBN*: 0132393212.
2. Lalit Narayan, etal, "Computer Aided Design and Manufacturing", PHI, ISBN: 978-81-203-3342-0.
3. Farid Amirouche, "Principles of Computer Aided Design and Manufacturing", Pearson Education, 2nd Edition, and ISBN Number: 978-0130646316.

COURSE OUTCOMES:
The students will be able to
1. Draw the part drawings which are utilized in real time applications.
2. Understand the different types of stress analysis, load calculations by using ANSYS software.
3. Analyze 2D and 3D part drawings using AutoCAD, Pro-E software packages.
4. Develop and understand the NC part program generation by using CADEM packages.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A97310)PRODUCTION DRAWING PRACTICE

IV Year B.Tech. Mech. Engg. I-Sem

L	T	P	C
0	0	3	2

COURSE OBJECTIVES:
1. To gain knowledge about conventional representation of materials and machine parts.
2. To know different types of fits, tolerance and surface roughness of various machine parts to apply in part drawings.
3. To understand the design of machine parts and also get acquainted with working principle
4. Understand the stress analysis of different types of beams.
5. To understand the thermal analysis of heat transfer systems
6. To gain the knowledge of CFD analysis of simple fluid flow systems.

UNIT – I
CONVENTIONAL REPRESENTATION OF MATERIALS
Conventional representation of parts – Screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits – methods of indicating notes on drawings.

UNIT – II
LIMITS AND FITS
Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.
Form and Positional Tolerances: Introduction and indication of the tolerances of form and position on drawings, deformation of radial run out and axial run out and their indication.

UNIT – III
SURFACE ROUGHNESS AND ITS INDICATION
Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.
Heat treatment and surface treatment symbols used on drawings.

UNIT – IV
DETAILED AND PART DRAWINGS
Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

UNIT – V
Part drawing using computer aided drafting by CAD software.

TEXT BOOKS:
1. K.L.Narayana & P.Kannaiah, "Production and Drawing", New Age, 3rd Edition, *ISBN* (13) : 978-81-224-2518-5
2. Pohit and Ghosh, "Machine Drawing with Auto CD", PE 1st Edition, *ISBN*:9788131706770

REFERENCE BOOKS:
1. James D.Meadows, "Geometric dimensioning and tolerancing", B.S. Publications, 1st Edition, *ISBN*-13: 978-0824700768
2. R.K.Jain, "Engineering Metrology",Khanna Publications, 2013, *ISBN*-13, 9788174091536.

COURSE OUTCOMES:
At the end of the course, the student will get ability to:
1. Draw the part drawings which are utilized in real time applications.
2. Understand the different types of Limits, Fits and Tolerances.
3. Analyze stresses of 2D and 3D truss and deflection of beams using software packages.
4. Apply CFD analysis of simple fluid flow systems involving heat transfer, using CFD simulation software.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A98301)PRODUCTION PLANNING & CONTROL

IV Year B.Tech. Mech. Engg. II-Sem　　　　　　　　　　　　　**L T P C**
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COURSE OBJECTIVES:
1. Ensure efficient utilization of production facilities and to coordinate the production activities of different departments.
2. Maintain adequate but not excessive stock of raw materials; work in process and of finished goods to meet production requirements.
3. Plan delivery schedules at the most economical level.
4. Establishing targets and checking it against performance.
5. Provide alternative production strategies in case of emergencies. Have better control over stocks of raw material, Work in process and finished goods.
6. Ensure production of right product in right quality at the right time

UNIT – I
INTRODUCTION
Definitions – Objectives of Production Planning and Control – Functions of production planning and control – Elements of production control - Types of production - Organization of production planning and control, Internal organizations department.
Forecasting: Definition- importance of forecasting - factors affecting the forecast- types of forecasting and their uses-demand patterns - general principles of forecasting techniques-quantitative techniques- qualitative techniques- measures of forecasting errors.

UNIT – II
INVENTORY MANAGEMENT
Functions of inventories – relevant inventory costs – ABC analysis – VED analysis –Basic EOQ model- Inventory control systems –continuous review systems and periodic review systems, MRP, ERP, and JIT Systems-Basic Treatment only.
Aggregate planning: Definition – aggregate planning strategies – aggregate planning methods – transportation model.

UNIT – III
LINE BALANCING
Terminology, Methods of Line Balancing, and RPW method-Largest Candidate rule method.
Routing – Definition – Routing procedure – Factors affecting routing procedure, Route Sheet.

UNIT – IV
SCHEDULING
Definition – Scheduling Policies – types of scheduling methods – difference with loading – flow shop scheduling **–** job shop scheduling, line of balance(LOB)-objectives-steps involved.

UNIT – V
DISPATCHING
Definition – activities of dispatcher – dispatching procedures – various forms used in dispatching.
Follow up: definition – types of follow up – expediting – definition – expediting procedures-Applications of computers in planning and control.

TEXT BOOKS:
1. Samuel Elion, Elements of Production Planning and Control", *ISBN*-13: 9788185027098.
2. R.K.Jain, "Production planning and Control", Khanna publishers.

REFERENCE BOOKS:
1. Ravi Shankar, "Industrial Engineering and management", Galgotia Publishers, 2nd Edition, *ISBN Number*: 978-8175156050.
2. Panner Selvam, "Production Operation Management", PHI Publishers, 2nd Edition, *ISBN*, 8120327675, 9788120327672.
3. Moore, "Production Control", ISBN 13: **9780070429215.**
4. Joseph S. Martinich, "Production and Operations Management", John Willey & Sons, 1st Edition, ISBN-13: 978-0471546320.

COURSE OUTCOMES:
The students will be able to
1. Design and plan an economical production system.
2. Learn about effective utilization of plant resources
3. Provide alternate production strategies
4. Guide shop floor people for manufacturing products of required quantity and required quality in right time.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A98302) RELIABILITY ENGINEERING
(ELECTIVE-IV)

IV Year B.Tech. Mech. Engg. II-Sem   **L   T   P   C**
                                                            4   1   0   4

COURSE OBJECTIVES:
     To teach students, - Understanding of basic principles of Reliability for ensuring sustainable product design. - Application to system requirements, design, manufacturing and testing, with real-world examples. - Understand in detail Asset Management, Maintenance, Quality and Productiveness.

UNIT I
Fundamental concepts of Reliability 8 hrs Reliability terminologies, Role of the reliability function in the organization, Interrelationship of safety, quality and reliability, life characteristic phases, Product liability-Significance, importance of reliability, Introduction to maintainability, availability. Concepts of Failure, failure density, failure Rate, hazard rate, pdf, cdf. Modes of failure, Mean Time To Failure (MTTF), Mean Time Between Failure (MTBF), Numericals based on calculation of failure rate, hazard rate. Warranty Management and Life cycle cost.

UNIT II
Probability Concepts and System Reliability 10 hrs Basic probability concepts, Laws of probability, Introduction to independence, mutually exclusive, conditional probability, Discrete and continuous probability distributions, Comparison of probability distributions - binomial, normal, lognormal, Poisson, Weibull, exponential, Standard deviation, variance, mean, mode and Central Limit Theorem. Analysis of series, parallel, mixed configurationsystems ,Concept of k- out of n structure, Conditional probability method, delta-star method for conditional probability analysis, Tie-set and Cut Set method (Concepts and Numericals).

UNIT III
System reliability Analysis 8 hrs Reliability Improvement- Redundancy, element redundancy, unit redundancy, standby redundancytypes of stand by redundancy, parallel components single redundancy, multiple redundancies (Numericals). Introduction to Reliability allocation or apportionment, reliability apportionment techniques - equal apportionment, AGREE, ARINC, Minimum effort method (Numericals).

UNIT IV
Reliability Management 8 hrs Objectives of maintenance, types of maintenance, Maintainability, factors affecting maintainability, system down time, availability - inherent, achieved and operational availability (Numerical treatment). Introduction to Reliability Centered Maintenance. Savitribai Phule Pune University, Pune 2012 Course BOS Mechanical Engineering SPPU Page 16 Design for maintainability and its considerations, Reliability and

costs, Costs of Unreliability, Standards for Reliability-MIL Handbook 217F & Carderock Model. Technology aspects in Reliability Management, BIT (Built in testing).

UNIT V

Reliability in Design & Development 8 hrs Reliability techniques- Failure mode, effects analysis (FMEA),Failure mode, effects and criticality analysis (FMECA)-Case Studies, Basic symbols, Fault Tree construction and analysis, Monte Carlo Simulation. Introduction to Design of Experiments (DOE) and Taguchi Method. Human factors in design and design principles.

TEXT BOOKS
1. Kapur, ― Reliability in engineering Design‖, Wiley india
2. Chandrupatla, ― Quality and Reliability in Engineering‖ Cambridge Uni. Press, India
3. S S. Rao, Reliability Based Design, McGraw Hill Inc. 1992
4. L.S.Srinath, Reliability Engineering, EWP , 4th Edition 2011
5. Bryan Dodson, Dennis Nolan, Reliability Engineering Handbook, Marcel Dekker Inc, 2002
6. Basu S.K, Bhaduri , Terotechnology and Reliability Engineering, Asian Books Publication

REFERENCE BOOKS
1. Alessandro Birolini, Reliability Engineering Theory and Practice, Springer
2. R.M. Parkhi, Market Leadership by Quality and Reliability, Vidyanand Publications 2012
3. V.N.A. Naikan, Reliability Engineering and Life Testing, PHI Learning 2010
4. Charles E. Ebeling, Reliability and Maintainability Engineering, TMH 2009
5. Dr. Robert B. Abernathy, The New Weibull Handbook.

COURSE OUTCOMES:
After completion of the course students would be able to, - Understand and analyze different methods of failure. - Calculate MTTF, MTBF, failure rate and hazard rate. - Different probability methods applied to Reliability. - Optimize Cost & reliability. - Perform FEMA, FMECA, DOE, Taguchi method. - Different methods to test reliability

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A98303) MECHATRONICS
(ELECTIVE-IV)

IV Year B.Tech. Mech. Engg. II-Sem

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:

Students will be able to

i) Know the basic concepts of mechanics.
ii) Know the various actuating systems like Hydraulic, pneumatic, mechanical and electrical actuating system.
iii) Know about the micro processor and micro controllers.
iv) Know about the system and interfacing and data acquisition.

UNIT-I

Mechatronics systems, elements, levels of mechatronics system, Mechatronics design system, measurement systems, control systems, microprocessor-based controllers, advantages and displacement,position,proximity,velocity,motion,force,acceleration,torque,fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices, PN Junction diode, BJT, FET, DIA and TRIAC. Analog signal conditioning, amplifiers, filtering. Introduction to MEMS & typical applications.

UNIT-III

Hydraulic and pneumatic actuating systems, Fluid systems, Hydraulic and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems: Mechanical actuating systems and electrical actuating systems.

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition , DAQS, SCADA, A to D and D to A conversions; Dynamic models and analogies, System response . Design of mechatronics systems & future trends.

TEXT BOOKS:

1. Mechatronics Integrated Mechanical Electronics Systems/KP Ramachandran &GK Vijaya Raghavan/WILEY india Edition/2008
2. Mechatronics Electronics control systems in Mechanical and Electrical Engineering/W Bolton/Pearson Education press/3rd edition,2005.

REFERENCE BOOKS:

1. Mechatronics Source books by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N.Shanmugam/ Anuradha Agencies Publishers.
3. Mechatronics System Design/Devdas shetty/Richard/Thomson.

COURSE OUTCOMES:
 Student can be able to do

i) Use the control system; mechatronics design systems and measurement systems.
ii) Work on various actuating systems.
iii) Convert the signals from one from to another form.
iv) Estimate the micro controllers and micro processors.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A98304) PLANT LAYOUT & MATERIAL HANDLING
(ELECTIVE – IV)

IV Year B.Tech. Mech. Engg. II-Sem　　　　　　　　　　　　　**L　T　P　C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　4　1　0　4

COURSE OBJECTIVES:
1. Understand the various types of plant layouts
2. Design the plant layout for different type of industries
3. Understand the importance of material handling in the overall production cost
4. Know how to avoid the bottlenecks in material handling systems.
5. Know the various safety measures to be taken in material handling systems
6. Know how to design miscellaneous equipments.

UNIT – I
Introduction-Classification of Layout, Advantages and Limitations of different layouts, Layout design procedures. Overview of the plant layout.
Process Layout and Product Layout: Selection, specification, Implementation and follow up, comparison of product and process layout.

UNIT – II
Heuristics for plant layout-ALDEP, CORELAP, CRAFT, Group Layout, Fixed position layout – Quadratic assignment model. Branch and bound method.

UNIT – III
Introduction, Material handling systems material Handling principles, Classification of Material Handling equipment, Relationship of material handling to plant layout.

UNIT – IV
Basic Material Handling Systems: Selection, Material Handling method- path, Equipment, 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. PB Mahapatra, "Operations Management", PHI, 2nd Ed. 2010, *ISBN* 13: 9788120339262.
2. Dr.KC Arora & Shinde, "Aspects of Material handling", Lakshmi Publications, 2007,s *ISBN*-13: 9789381159262.

REFERENCE BOOKS:
1. RI, Francis, LF Mc Linnis Jr.White, "Facility Layout & Location an analytical approach", PHI, 2nd Ed. 2000, ISBN-13: 978-0132992312.
2. R Panneerselvam, "Production and Operations Management", PHI 2nd Edition, *ISBN*, 8120327675, 9788120327672.
3. Ray, Siddhartha, "Introduction to Material handling", New Age 2010 / ISBN No.: 9788122420999 / 8122420990.

COURSE OUTCOMES:

The students will be able to

1. Get the knowledge of various types of material handling systems.
2. Understand merits, demerits and applications of different types of plant layouts.
3. Get the knowledge of applications of ergonomics in material handling
4. Get the knowledge of designing of cost effective material handling systems.

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