VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005
(AUTONOMOUS)
MECHANICAL ENGINEERING
COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2015-2016 onwards)

I Year **I SEM**

Sl.NO	Code	Subject	L	T	P	Credits
1	A9001	Mathematics-I	4	0	0	4
2	A9012	English	3	0	0	3
3	A9011	Engineering Chemistry	3	0	0	3
4	A9301	Engineering Mechanics-I	2	2	0	3
5	A9304	Engineering Graphics-I	2	0	4	4
6	A9504	Computer Programming	3	0	0	3
7	A9013	English Language Communication Skills Lab	0	0	3	2
8	A9505	Computer Programming Lab	0	0	3	2
Total			17	2	10	24

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005
(AUTONOMOUS)
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2015-2016 onwards)

I Year **II SEM**

Sl.NO	Code	Subject	L	T	P	Credits
1	A9002	Mathematics-II	3	1	0	4
2	A9009	Engineering Physics	3	0	0	3
3	A9302	Engineering Mechanics-II	3	1	0	4
4	A9305	Engineering Graphics-II	2	0	4	4
5	A9508	OOPs &Data structures	3	0	0	3
6	A9307	Engineering Work shop & IT workshop	0	0	3	2
7	A9010	Engineering Physics Lab	0	0	3	2
8	A9509	OOPs &Data structures Lab	0	0	3	2
Total			**14**	**2**	**13**	**24**

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005

(AUTONOMOUS)
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the Batches admitted from A.Y. 2015-2016 onwards)

II Year **I SEM**

Sl.NO	Code	Subject	L	T	P	Credits
1	A9203	Basic Electrical & Electronics Engineering	3	0	0	3
2	A9308	Metallurgy and Material Science	4	0	0	4
3	A9309	Mechanics of Solids	4	0	0	4
4	A9310	Thermodynamics	4	0	0	4
5	A9311	Machine Drawing	2	0	4	3
6	A9312	Mechanics of Solids and Metallurgy lab	0	0	3	2
7	A9313	Fuels and Lubricants Lab	0	0	3	2
8	A9204	Basic Electrical & Electronics Engineering Lab	0	0	3	2
TOTAL			17	0	13	24

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005

(AUTONOMOUS)
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the batches admitted from A.Y. 2015-2016 onwards)

II Year **II SEM**

Sl.NO	Code	Subject	L	T	P	Credits
1	A9019	Gender Sensitization	2	0	0	0
2	A9005	Probability & Statistics	4	0	0	4
3	A9314	Fluid Mechanics and Hydraulic Machinery	4	0	0	4
4	A9315	Thermal Engineering-I	4	0	0	4
5	A9316	Kinematics of Machines	4	0	0	4
6	A9317	Production Technology	4	0	0	4
7	A9318	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	2
8	A9319	Production Technology Lab	0	0	3	2
Total			**22**	**0**	**6**	**24**

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005

(AUTONOMOUS)
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the Batches admitted from A.Y. 2015-2016 onwards)

III Year **I SEM**

Sl. NO	Code	Subject	L	T	P	Credits
1	A9320	Machine Tools	3	0	0	3
2	A9321	Dynamics of Machinery	4	0	0	4
3	A9322	Design of Machine Members-I	4	0	0	4
4	A9323	Metrology And Surface Engineering	3	1	0	3
5	A9324	Thermal Engineering-II	3	1	0	3
6	A9022	Human Values & Professional Ethics	2	0	0	0
7		**OPEN ELECTIVE-1**	3	0	0	3
	A9601	1. Managerial Economics & Financial Analysis				
	A9603	2. Principles of Entrepreneurship				
	A9626	3. Intellectual Property Rights				
8	A9325	Thermal Engineering Lab	0	0	3	2
9	A9326	Metrology& Machine Tools Lab	0	0	3	2
TOTAL			**22**	**2**	**6**	**24**

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005

(AUTONOMOUS)
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the Batches admitted from A.Y. 2015-2016 onwards)

III Year **II SEM**

Sl.NO	Code	Subject	L	T	P	Credits
1	A9327	Finite Element Methods	4	0	0	4
2	A9328	Design of Machine Members-II	4	0	0	4
3	A9329	Heat Transfer	3	1	0	3
4	A9014	Environmental Studies	3	0	0	0
5		**OPEN ELECTIVE-II**	3	0	0	3
	A9330	1. Nano Technology				
	A9501	2. Data Base Management Systems				
	A9127	3. Disaster Management				
6		**PR0FESSIONAL ELECTIVE-I**	3	0	0	3
	A9331	1. Automobile Engineering				
	A9535	2. Artificial Neural Networks				
	A9332	3. Mechatronics				
7		**PR0FESSIONAL ELECTIVE-II**	3	0	0	3
	A9333	1. Mechanics of Composite Materials				
	A9334	2.Refrigeration and Air Conditioning				
	A9335	3. Maintenance and Safety Engineering				
8	A9336	Heat Transfer Lab	0	0	3	2
9	A9021	Advanced English Communications Skills Lab	0	0	3	2
TOTAL			**23**	**1**	**6**	**24**

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005

(AUTONOMOUS)
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the Batches admitted from A.Y. 2015-2016 onwards)

IV Year **I SEM**

Sl.NO	Code	Subject	L	T	P	Credits
1	A9337	Industrial Management	3	1	0	3
2	A9338	CAD/CAM	3	1	0	3
3	A9339	Instrumentation & Control Systems	3	1	0	3
4		**PROFESSIONAL ELECTIVE-III**	3	0	0	3
	A9340	1. Unconventional Machining Process.				
	A9341	2. Power Plant Engineering				
	A9342	3. Design for Manufacturing				
5		**PROFESSIONAL ELECTIVE-IV**	3	0	0	3
	A9343	1. Robotics				
	A9344	2.Computational Fluid Dynamics				
	A9345	3. Gas Dynamics				
6		**PROFESSIONAL ELECTIVE-V**	3	0	0	3
	A9346	1. Non Conventional Energy Sources				
	A9347	2. Mechanical Vibrations				
	A9348	3. Automation in Manufacturing				
7	A9349	CAD/CAM Lab	0	0	3	2
8	A9350	Production Drawing Practice/ Instrumentation & Control Systems Lab	0	0	3	2
9	A9351	Industry Oriented Mini Project	0	0	0	2
TOTAL			**18**	**3**	**6**	**24**

VAAGDEVI COLLEGE OF ENGINEERING, WARANGAL – 506005

(AUTONOMOUS)
MECHANICAL ENGINEERING

COURSE STRUCTURE
(Applicable for the Batches admitted from A.Y. 2015-2016 onwards)

IV Year **II SEM**

Sl.NO	Code	Subject	L	T	P	Credits
1		**OPEN ELECTIVE-III**	3	1	0	3
	A9352	1. Production Planning & Control				
	A9353	2. Reliability Engineering				
	A9006	3. Operations Research				
2		**PR0FESSIONAL ELECTIVE-VI**	3	1	0	3
	A9354	1. CNC Technology				
	A9355	2. Plant Layout & Material Handling				
	A9356	3. Jet Propulsion & Rocket Engineering				
3	A9357	Project Work	0	0	15	12
4	A9358	Comprehensive viva	0	0	0	3
5	A9359	Seminar	0	0	3	3
TOTAL			**6**	**2**	**18**	**24**

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 0 0 3

(A9320) MACHINE TOOLS

COURSE OBJECTIVES:

1. Student will be able to understand construction and working of various machine tools like lathe, milling, shaping and drilling, grinding, planning machines etc.
2. Student will understand principles and economics of metal cutting and able to select the economical machining process.
3. 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.
4. 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.
5. Students will learn to monitor cutting tool conditions through force transducers and surface finish inspection.

UNIT – I

ELEMENTARY TREATMENT OF METAL CUTTING THEORY: Elements of cutting processes – Geometry of single point cutting tool, chip formation and types of chips – built up edge and its effects on chip breakers. Mechanics of orthogonal cutting – Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, tool wear, coolants, machinability – Tool materials.

UNIT – II

LATHE: Principle of working, specification of lathe – types of lathe – work holders, tool holders –tool boxes. 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. Kinematic scheme of lathe.

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: Principles of working – specifications – classifications of milling machines – Principal features of horizontal, vertical and universal milling machines –milling operations. Geometry of milling cutters – milling cutters – methods of indexing – Accessories to milling machines, kinematic scheme of milling machines.

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 among grinding, lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations

JIGS AND FIXTURES: 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

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.

TEXT BOOKS:

1. P.C. Sharma, "A text book of manufacturing Technology – II", S. Chand, 2010, ISBN 13: 9788121928465.
2. Workshop Technology Vol – II by B.S. Raghuvamsi.
3. 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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

4 0 0 4

(A9321) DYNAMICS OF MACHINERY

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

Gyroscopic Introduction – Angular Motions – Gyroscopes – effect of precession – 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. Torque and power loss due to friction.

Brakes and Dynamometers: Analysis of 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 and damped vibration. Vibration Isolation & Transmissibility-Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.

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.

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

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. I-Sem	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

(A9322) DESIGN OF MACHINE MEMBERS – I

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 power drives suitable to transfer power requirements.

UNIT – I

INTRODUCTION

Definition, Types of design, General Considerations in the design – Design

Procedure – Selection of Materials for design and manufacturing.

Stresses in Machine Members: Simple stresses – Combined stresses - stress strain relation – Various theories of failures – factor 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, Gerbers line.

UNIT – III

DESIGN OF FASTENERS

Riveted joints – definition, types and design Failures in riveted joints, terminology used in riveted joints, lozenze joint, riveted joints with eccentric loads- 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, jib 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.

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 of shafts , shaft couplings like flange couplings, flexible couplings.
3. Determine the Stresses and deflections of helical springs, bolded joints, keys, cotters, knuckle joints.
4. Design of riveted, welded joint and screwed joints.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 1 0 3

(A9323) METROLOGY AND SURFACE ENGINEERING

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

Line, end and wave length standards, 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.

Surface Measurement: Measurement of flatness– 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, Electronic and 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.

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.

They are able to understand the basic techniques of surface engineering, surface treatment, surface coatings, and surface cleanings

TEXT BOOKS:

1. Metrology and Surface engineering by Mahajan & RK Jain / Khanna Publishers
2. Engineering Metrology/I C Gupta / Dhanpath Rai.

REFERENCE BOOKS:

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

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 1 0 3

(A9324) THERMAL ENGINEERING – II

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 AND CONDENSORS

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 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 – IV

REACTION AND IMPULSE TURBINES

Steam Turbines: Classification, Analysis of various types of steam turbines, Delaval, Curtis, Ratean, Condensing and Non Condensing Turbines.

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.

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 – 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.

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

2 0 0 0

(A9022) HUMAN VALUES AND PROFESSIONAL ETHICS

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/you tube/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

VAAGDEVI COLLEGE OF ENGINEERING
AUTONOMOUS

(A9601) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(OPEN ELECTIVE-I)

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

L	T	P	C
3	0	0	3

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 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.

VAAGDEVI COLLEGE OF ENGINEERING
AUTONOMOUS

(A9603) PRINCIPLES OF ENTREPRENEURSHIP
(OPEN ELECTIVE-I)

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

L	T	P	C
3	0	0	3

Course Objective: The objective of the course is to make students understand the nature of entrepreneurship, and to motivate the student to start his/her own enterprise. The objective of the course is to enlighten with the fragrance of Corporate Good Governance and Business Ethics, so that they would become the best entrepreneurs / managers of the corporate world.
Learning Outcome: By the end of this course the students should be able to understand the mindset of the entrepreneurs, identity ventures for launching, develop an idea on the legal framework and also understand strategic perspectives in entrepreneurship.

Unit – I
Nature of Entrepreneurship; Characteristics – Qualities and skills of an Entrepreneur – Functions of entrepreneur – Entrepreneur scenario in India and Abroad. Forms of Entrepreneurship: Small Business – Importance in Indian Economy – Types of ownership – Sole trading – Partnership – Joint stock company and other forms. First – Mover disadvantages, Risk Reduction strategies, Market scope strategy, Imitation strategies and Managing Newness

Unit – II
Aspects of Promotion: Generation of new entry opportunity, SWOT Analysis, Technological Competitiveness, legal regulatory systems, patents and trademarks, Intellectual Property Rights- Project Planning and Feasibility Studies- Major steps in product development. Financial Aspects: Sources of raising Capital, Debt-Equity, Financing by Commercial Banks, Government Grants and Subsidies, Entrepreneurship Promotion Schemes of Department of Industries (DIC), KVIC, SIDBI,NABARD, NSIC, APSFC, IFCI and IDBI. New Financial Instruments.

Unit - III
Introduction to Business Ethics: Necessity for Business Ethics-Need for Ethical guideline – Salient Issues in Ethics and Commerce- Ethics as a Luxury – Earlier attempts at Ethics in Industry – Justification for Ethics – Effect of Migration of National Character – Shadow Economy – Basic Principles in Ethics – Corporate Climate and corporate climate audits – Political Issues – Nature and theory of Ethics – The Naturalistic fallacy - G.E.Moore's Philosophy.

Unit – IV
Understanding Corporate Governance: Corporate Governance- Capitalism at crossroads – Historical perspective of Corporate Governance – Issues of Corporate Governance – Theoretical basis of Corporate Governance – Corporate Governance mechanisms – Indian Model of Governance – Good Corporate Governance – Corporate Governance committees – OECD

Principles – Indian Committee and guidelines – The confederation of Indian Industry's initiative. Corporate Governance Models, Corporate Social Responsibility.

Unit – V

Corporate Social Responsibility: System Concept of Business Society – Social Responsibility – Social Responsibility tools – approaches to Ethics – Corporate Social Accountability - Business in a Social World – Ethics and Social Responsibility – professional ethics – Ethics of practicing company secretaries- Ethical investing.

Text Books:

1. Robert D Hisrich, Michael P Peters, Dean A Shepherd: Entrepreneurship, TMH, 2009
2. Vasanth Desai: Entrepreneurship, HPH, 2009
3. C.S.V.Murthy: Business Ethics & Corporate Governance, Himalaya, 2009.

References:

1. Bholanath Dutta: Entrepreneurship Text and Cases, Excel, 2009
2. David Martin: Corporate Governance, Viva, 2009
3. H. Nandan: Fundamentals of Entrepreneurship, PHI, 2009.
4. Barringer: Entrepreneurship, Pearson,2009.
5. Ronald D Francis & Mukti Mishra: Business Ethics, TMH, 2009
6. RK Mishra,Gitarani: Corporate Governance, Excel,2009
7. A.C.Frenando: Corporate Governance, Pearson, 2006
8. V.Balachandran & V.Chandrasekaran: Corporate Governance & Social Responsibility, PHI, 2009
9. A.C.Fernando: Business Ethics, Pearson, 2009
10. Laura P Hartman & Abha Chatterjee: Business Ethics, TMH, 2009
11. Tripat Kaur: Values and Ethics in Management, 2/e, Paragon International,2009.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A9626) INTELLECTUAL PROPERTY RIGHTS
(Open Elective-I)

III year B. Tech I- Semester **L T P C**

3 0 0 3

Prerequisites: None

Course Objectives:

The course covers all aspects of the intellect: Images, names, inventions, literary works, artistic works etc. It also addresses new and upcoming areas of intellectual property (IP) like Bio Technology, domain names, creative commons, etc.

UNIT-I

Introduction to Intellectual Property Law – Types of property Intellectual Property, Agencies Responsible, The increasing importance of intellectual property Rights. The law of trademark-Purpose and functions of Trade Marks, Types of Marks, and Acquisition of trade mark Rights.**(Pg.No: 1-22)**

UNIT-II

Trade mark selection and searching – Trade mark Registration Process – Post registration Procedures

Trade mark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement - Dilution New developments in Trade mark –International Trade mark Law. (**Pg.No: 42-169)**

UNIT-III

Introduction to Copyrights – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitations - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act (**Pg.No: 173-312)**

UNIT -IV

The law of patents-patent searches –Patent ownership and transfer-Patent infringement- International Patent Law. (**Pg.No: 319-438)**

UNIT-V

Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law. (**Pg.No: 439-488)**

Text Book:

1. Debirag E.Bouchoux: "Intellectual Property" 4. Cengage learning, New Delhi

References:

1. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.
2. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
3. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw –Hill, New Delhi
4. J Martin and C Turner "Intellectual Property" CRC Press
5. Richard Stimm " Intellectual Property" Cengage Learning

Course Outcomes:

CO-2: An ability to apply knowledge of mathematics, science and engineering to real world problem.

CO-3: Ability to model, understand and develop complex software for system software as well as application software.

CO-7: The broad education necessary to understand the impact of computer science and engineering solutions in the scientific, societal and human contexts.

CO-8: A recognition of the need for, and an ability to engage in life-long learning.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

L	T	P	C
0	0	3	2

(A9325) THERMAL ENGINEERING LABORATORY

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.

List of Experiments:

1. Single cylinder 4-stroke Diesel engine test Rig (Mechanical Loading).
2. 4-Stroke multi cylinder Petrol Engine test Rig.
3. Valve and Port timing Diagram Experiment.
4. 2-stage reciprocating Air Compressor
5. Study of Boiler models.
6. Assemble and Dissemble of Engine
7. Single cylinder 4-stroke Diesel engine test Rig (Electrical Loading)
8. Single cylinder 2-stroke Petrol engine test Rig
9. Variable compression ratio petrol engine Test Rig (DC dynamo meter loading)
10. Heat balance on SI and CI engines

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

0 0 3 2

(A9326) METROLOGY AND MACHINE TOOLS LABORATORY

COURSE OBJECTIVES:

1. Apply the principles of metrology with the measuring instruments, Vernier calipers, micrometer, bevel protractor, tally surf , tool maker's microscope, sinebar 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. Thread Measurement by 2- wire and 3- wire method.
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.

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, sinebar 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. Introduction of 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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

4 0 0 4

(A9327) FINITE ELEMENT METHODS

COURSE OBJECTIVES:

1. To analyse various engineering objects by deserting them in to small elements.
2. To analyse 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 analyse two dimensional elements by using constant strain triangles methods.
6. To analyse 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 equation of elasticity. Stress – Strain and strain – displacement relations for 2-D and 3-D. Rayleigh – Ritz method, weighted residual methods.

One Dimensional Problems: Finite element modeling co-ordinates and shape functions. Finite element equations for an axial bar element in local coordinates using Potential energy approach– Finite element analysis of uniform, stepped and tapered bars subjected to mechanical loads – Assembly of Global stiffness matrix and load vector – Quadratic shape functions.

UNIT – II

Analysis of Trusses: Stiffness matrix for plane truss elements, Stress calculations and problems.

Analysis of Beams: Hermite shape functions – Element stiffness matrix – Load vector – simple Problems.

UNIT – III

2-D PROBLEMS

Finite Element modeling of two dimensional stress analysis with Constant Strain Triangles (CST) and treatment of boundary conditions. Estimation of Load vector, stresses.

Finite element modeling of axi symmetric solids subjected to Axi symmetric loading with triangular elements.

Two dimensional 4 noded isoparametric elements and problems.

UNIT – IV

SCALAR FIELD PROBLEMS

Study state Heat transfer analysis: One dimensional analysis of Slab, fin and two dimensional analysis of thin plate- problems.

UNIT – V

DYNAMIC ANALYSIS

Dynamic equations – Lumped and consistent mass matrices – Evaluation of Eigen values and Eigen vectors – mode shapes for a stepped bar and beams.

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

4 0 0 4

(A9328) DESIGN OF MACHINE MEMBERS – II

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.

DESIGN OF MACHINE MEMBERS-II

UNIT-I

Bearings: Types of Journal bearings-basic modes of Lubrication – Bearing Modulus – full and partial bearings – Clearance ratio – Heat dissipation of bearings, bearing materials – journal bearing design. Ball and roller bearings – Static load – dynamic load – equivalent radial load – design and selection of ball & roller bearings.

UNIT – II

Design of IC Engine Parts:

Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – Cranks and Crank shafts. Pistons, Forces acting on piston – Construction, Design and proportions of piston.

UNIT-III

Power Transmission Systems and Pulleys: Transmission of power by Belt and Rope ways, Transmission efficiencies, types of Belts, Ratio of tensions, initial tension and centrifugal tension – Ropes – pulleys for belt and rope drives-materials-chain drivers

UNIT-IV

Gears: Spur gears – load concentration factor – Dynamic load factor – analysis of spur gears – check for plastic deformation-check for dynamic and wear consideration.

Helical and bevel gear drivers: Helical and bevel gears – load concentration factor-Dynamic load factor-analysis of helical and bevel gears- check for plastic deformation-check for dynamic and wear consideration.

Design of worm gears: Properties of worm gears – selection of materials – strength and wear rating of worm gears- force analysis-friction in worm gears.

UNIT- V

Design of Power Screws: Design of Screw – design of nut – compound screw – differential screw – ball screw – possible failures and remedies.

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.

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.
3. Design data book, PSG Data Book.

NOTE:- Design Data Book To be Provided by the time of Examination.

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: 97881896382

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 1 0 3

(A9329) HEAT TRANSFER

COURSE OBJECTIVES:

1. To understand the basic differences between the modes of heat transfers conduction, connection 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 and 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 causation of flow, condition of flow, configuration of flow and medium of flow – Dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem and method, application for developing semi – empirical non-dimensional correlation for convection heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

Free Convection: Development of Hydrodynamic and Thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates and Pipes.

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.

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

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 and Boltzmann – heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation network.

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

(A9014) ENVIRONMENTAL STUDIES

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

3 0 0 3

Pre Requisites : None

Course Objectives:

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

UNIT-I: Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II: Natural Resources: Classification of Resources, Living and Non-Living resources, water **resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III: Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habital loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV: Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types ofpollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waster:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater

Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

UNIT-V: Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

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

1. Understanding of Ecosystem,
2. Natural resources, Depletion of natural resources & prevention of natural resources.
3. Biodiversity, Protection, sharing of the biodiversity.
4. Environmental pollution, Understanding of water, soil, noise, air pollutions and their control measurements following the rules of environmental policy, legislation. Working towards the sustainable future.

SUGGESTED TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagoplalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology – Dr. M. Anji Reddy 2007, BS Publications.

****

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9330) NANO TECHNOLOGY

(OPEN ELECTIVE-II)

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-1:

Introduction to Nanotechnology: Importance of nanoscale, Nanostructure types, electronic, magnetic, optical Properties of Nanomaterials, top-down and bottom – up approach to nanostructures.

Quantum Mechanical phenomenon in Nanostructures: Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum Wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

Unit-II:

Carbon Nano Structures: Carbon 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.

Nano Scale characterization techniques: Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD.

Unit-IV:

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.

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

Unit-V:

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

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
1. Make the learner familiarize with nanotechnology potentialities.

*****

TEXT BOOKS:

2. Charies.P.pode, introduction to nanotechnology, springer publications.
3. Springer Handbook of Nanotechnology-Bharat Bhusan.
4. 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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9501) DATABASE MANAGEMENT SYSTEMS

(OPEN ELECTIVE-II)

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 (15%)

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.

UNIT-II (20%)

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.

UNIT – III (20%)

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.

UNIT – IV(20%)

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

UNIT-V (25%)

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.

COURSE OUTCOMES:

1. A strong foundation in core Computer Science and Engineering, both theoretical applied concepts.
2. Ability to model, understands, and develop complex software for system software as well as application software.
3. The broad education necessary to understand the impact of Computer Science and Engineering solutions in the scientific, societal and human contexts .
4. 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

TEXTBOOKS.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

(A9127) DISASTER MANAGEMENT

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

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 -I

Understanding Disaster: Concept of Disaster - Different approaches - Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional).

Hazards and Vulnerability: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards, Precautions and Alarming of people.

UNIT-II

Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief Methods of Rehabilitation.

UNIT-III

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

UNIT-IV

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

UNIT-V

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan – Forming management teams and their responsibilities - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans.

Text Books

Alexander, D., "Natural Disasters", ULC press Ltd, London, 1993.
Carter, W.N., "Disaster Management: A Disaster Management Handbook", Asian Development Bank, Bangkok, 1991.
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

****

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9331) AUTOMOBILE ENGINEERING

(PROFESSIONAL ELECTIVE-I)

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 – solar photo – voltaic, hydrogen, bio mass, alcohals , LPG, CNG, Liquid fuels and gaseous fuels, 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 cooling System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

UNIT – IV

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

Transmission System: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. Propeller shaft – Hootch – 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.

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.

TEXT BOOKS:

1. Kirpal 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.
2. P. RamiReddy, "Alternative fuels of Automobiles", Frontline publications.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9535) ARTIFICIAL NEURAL NETWORKS

(PROFESSIONAL ELECTIVE-I)

Objectives

- To survey of attractive applications of artificial neural networks.
- To practical approach for using artificial neural networks in various technical, organizational and economic applications.

UNIT I

INTRODUCTION - what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks (p. no's 1 –49) LEARNING PROCESS 1 – Error Correction learning, Memory based learning, Hebbian learing, (50-55).

UNIT II

LEARNING PROCESS 2: Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process, (p. no's 50 –116) SINGLE LAYER PERCEPTRONS – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception –convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment (p. no's 117 –155).

UNIT III

MULTILAYER PERCEPTRON – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection, (p. no's 156 – 201) **BACK PROPAGATION** - back propagation and differentiation, Hessian matrix,

Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning. (p. no's 202 –234).

UNIT IV

SELF ORGANIZATION MAPS – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification, Hierarchal Vector quantizer, contexmel Maps (p. no's 443 –469, 9.1 –9.8).

UNIT V

NEURO DYNAMICS – Dynamical systems, stability of equilibrium states, attractors, neurodynamical models, manipulation of attractors' as a recurrent network paradigm (p. no's 664 –680, 14.1 –14.6) HOPFIELD MODELS – Hopfield models, computer experiment I (p. no's 680-701, 14.7 –14.8).

TEXT BOOK:

1. Neural networks A comprehensive foundations, Simon Haykin, Pearson Education 2nd Edition 2004 .

REFERENCE BOOKS:

1. Artificial neural networks - B.Yegnanarayana Prentice Hall of India P Ltd 2005.
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
3. Neural networks James A Freeman David M S kapura Pearson Education 2004.

Outcomes

Students who have successfully completed this course

Course outcomes

- Artificial and Biological Neural Networks.
- Architecture of different algorithms Neural controller for a temperature process.
- Fuzzy logic principles.
- Membership principles and functions.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9332) MECHATRONICS

(PROFESSIONAL ELECTIVE-I)

Course objects:-

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.

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.

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.

REFERENCES:

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9333) MECHANICS OF COMPOSITE MATERIALS

(PROFESSIONAL ELECTIVE-II)

Objectives

- To make the basic understanding of linear elasticity with emphasis on the difference between isotropic and anisotropic material behavior
- An ability to compute the elastic constants, elastic stiffness and compliance matrices using matrix algebra.
- An ability to analyze a lamina for stress and strain tensors using Generalized Hooke's law
- Ability to analyze a laminated plate in bending from classical laminate theory, and finding laminate properties from lamia
- Ability to predict the failure strength of a laminated composite plate using different failure theories.

UNIT-I

Introduction to Composite Materials: Introduction ,Classification Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber-Reinforced Composites and nature-made composites, and applications .

Reinforcements: Fibers- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibers. Particulate composites, Polymer composites, Thermoplastics, Thermosetts, Metal matrix and ceramic composites.

UNIT II

Micro mechanical Analysis of a Lamina: Introduction, Mass, Volume and Weight Fractions, Density and Void Content, Evaluation of Four Elastic Moduli, Strength of Materials Approach, Semi-Empirical Models, Elasticity Approach, Ultimate Strength of Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion

UNIT-III

Macro mechanical Analysis of a Lamina: Introduction, Definitions Stress, Strain, Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina.

UNIT-IV

Macro mechanical Analysis of Laminates: Introduction, Classical Laminate Theory, Stress–Strain Relations for a Laminate, Laminate Code, Special Cases of Laminate Stiffness's: Single Layered Configurations, Symmetric Laminates, Anti symmetric Laminates Un symmetric Laminates, Common Laminates In-Plane and Flexural Modulus.

UNIT-V

Failure Analysis of Laminates: Introduction, Strength failure Theories: Maximum Stress Failure Theory, Maximum Stain Failure Theory, Tsai-Hill Failure Theory, Tsai-Wu Failure Theory, Failure Analysis and Design of Special Cases of Laminates, Applications, Failure Criterion for a Laminate.

Outcomes:

Student will able to

- Highlight the appropriate use of composite materials in the industry
- Understand the significance of replacing existing metal structures with composite materials whenever beneficial
- Comprehend the complexity of design of composite materials and structures
- Apply of knowledge of mechanics of composite materials for analyzing advanced materials involved in current trends and research area
- Apply the knowledge of composite materials for designing structures for aerospace applications and smart structures

Text Books:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.
2. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press, 1994.

References:

1. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
2. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), By Autar K. Kaw ,**Publisher:** CRC
3. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold, New York, 1969.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9334) REFRIGERATION & AIR CONDITIONING

(PROFESSIONAL ELECTIVE-II)

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 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 NH_3 – 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.

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 for by calculating the heat loads.
4. Observe and analyze large capacity units like ice plants, cold storages and central A.C. units.

TEXT BOOKS:

1. CP Arora, "Refrigeration and Air Conditioning", TMH, 2nd Edition, ISBN Number: 978-0074630105.
2. SC Arora & Domkundwar, "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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

3 0 0 3

(A9335) MAINTENANCE AND SAFETY ENGINEERING

(PROFESSIONAL ELECTIVE-II)

Course objectives:-

Students will be able to

i) Know the modern maintenance strategies
ii) Know the various types of maintenance like preventive, corrective and inventory control in maintenance.
iii) Know the quality maintenance processes.
iv) Know the objective and importance of maintainability

UNIT-I

Introduction: Need for maintenance, facts and figures, modern maintenance strategy for the 21st century, engineering maintenance objectives and maintenance in equipment life cycle, terms and definitions.

Maintenance Management and control: Maintenance manual, maintenance, facility evaluation, functions of effective maintenance management, maintenance project control methods and maintenance management control indices.

UNIT-II

Types of maintenance: preventive maintenance, elements of preventative, maintenance program, establishing preventative maintenance program PM program evaluation and improvement, PM measures, PM models, corrective maintenance, corrective maintenance types, corrective

maintenance steps and downtime components, corrective maintenance measures, corrective maintenance models.

Inventory control in maintenance: inventory control objectives and basic inventory decisions, ABC inventory control methods, inventory control models two bin inventory control and safety stock, spares determination factors spares calculation methods.

UNIT-III

Quality and safety in maintenance: needs for quality maintenance processes, maintenance work quality, use of quality control charts in maintenance work sampling, post maintenance testing, reasons for safety problems in maintenance, guidelines to improve safety in maintenance work, safety officer's role in maintenance work, protection of maintenance workers.

Maintenance costing: reasons for maintenance costing, maintenance budget preparation methods and steps, maintenance labor cost estimation, material cost estimation, equipment life cycle maintenance cost estimation, and maintenance cost estimation models.

UNIT-IV

Reliability, reliability centered maintenance, RCM: Goals and principles, RCM process and Associated Questions, RCM program Components effectiveness measurement indicators, RCM benefits and reasons for its failures, reliability versus maintenance and reliability in support phase, bathtub hazard rate concept, reliability measures and formulas, reliability networks, reliability analysis techniques.

UNIT-V

Maintainability: maintainability importance and objective, maintainability in systems, life cycle, and maintainability design characteristics, maintainability functions and measures, common maintainability design errors.

Course outcomes:-

Students can be able to do

i) The maintenance in equipment life cycle.
ii) The preventive and corrective measures in maintenance.
iii) The inventory control in maintenance.
iv) The in costing and budget preparation
v) Take the reliability measures, reliability networks and reliability analysis techniques.
vi)

TEXT BOOKS:

1. Reliability, Maintenance and Safety Engineering By Dr. A.K.Guptha/ Laxmi Publications
2. Industrial Safety Management by L.M.Deshmukh / TMH

REFERENCE BOOKS :

1. Maintenance Engineering & Management by R.C.Mishra/ PHI
2. Reliability Engineering by Elsayed/ Pearson
3. Engineering Maintenance A modern approach, B.S Dhallon, 2002, C.R.R Publishers.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

0 0 3 2

(A9336) HEAT TRANSFER LABORATORY

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 case 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.

LIST OF EXPERIMENTS

(Perform any TEN Experiments)

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a insulating powder.
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

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

III Year B.Tech. Mech. Engg. II-Sem **L T P C**

0 0 3 2

(A9021)ADVANCED ENGLISH COMMUNICATION SKILLS LAB

Introduction

The introduction of the Advanced English 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.

1. 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.

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

3. Syllabus:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) 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 Advanced English Communication Skills (AECS) 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 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.

<u>Suggested Books:</u>

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.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

- The practical examinations for the Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.

- For the English Language lab sessions, there shall be continuous evaluation during the year for 30 sessional marks and 70 End Examination marks. Of the 30 marks, 20 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation

- **Seminar/ Professional Presentation**

- **A Report on the same has to be prepared and presented.**

- ***Teachers may use their discretion to choose topics relevant and suitable to the needs of students.***
- ***Not more than two students to work on each mini project.***
- ***Students may be assessed by their performance both in oral presentation and written report.***

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

(A9337) INDUSTRIAL MANAGEMENT

L	T	P	C
3	1	0	3

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

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 organizational 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 Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types and Evaluation of mechanistic and organic structures of organization 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, Separation, 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.

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 organization.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

L	T	P	C
3	1	0	3

(A9338)CAD/CAM

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

Introduction: Computer configuration for CAD Applications, Computer Peripherals for CAD

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 Revolution, 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

GROUP TECHNOLOGY: Part family, coding and classification, production flow analysis, advantages and limitations.

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

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

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

L	T	P	C
3	1	0	3

(A9339) INSTRUMENTATION AND CONTROL SYSTEMS

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. Static and 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, transfer Function - 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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 0 0 3

(A9340) UNCONVENTIONAL MACHINING PROCESSES

(PROFESSIONAL ELECTIVE-III)

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 Unconventional machining methods-Classification of Unconventional machining processes – considerations in process selection. Materials. Applications.

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

UNIT – II

ABRASIVE JET MACHINING: Abrasive jet machining, Water jet machining and abrasive water jet machining. Basic principles, equipments, process variables, mechanics of metal removal, performance Evaluation, applications 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, maskants and etchants.

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

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.

Magnetic abrasive finishing, Abrasive flow finishing, Electro stream drilling, shaped tube electrolytic machining.

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.

TEXT BOOKS:

1. Pandya P.C. and Shah H.S., "Modern Machining Process", TMH., 2008, 1st Edition, ISBN:9780070965539.
2. V.K.Jain, "Advanced Manufacturing Process", Allied publishers, Edition: 2012, ISBN-13: 978-1439852903.

REFERENCE BOOKS:

1. Serope Kalpakjian and Steven R.Schmid, "Manufacturing Engineering and Technology", Pearson Publications, 5th Ed. 2009, ISBN: 0132272717.Bhattacharya A, "New Technology", The Institution of Engineers, India 1984.
2. C.Elanchezhian, B.Vijaya Ramnath and M.Vijayan, "Unconventional Machining Processes", Anuradha Publications, 2005, ISBN Number: 9788120319585.
3. Unconventional Machining Processes by Bhattacharya.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 0 0 3

(A9341)POWER PLANT ENGINEERING

(PROFESSIONAL ELECTIVE-III)

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.

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. Fuel supply system, air starting equipment, lubrication and cooling system, super charging.

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

Direct Energy Conversion: Solar energy, fuel cells, Thermo electric and Thermo ionic, NHD generation.

UNIT – III

HYDRO ELECTRIC POWER PLANT

Water power – Hydrological cycle/flow measurement – drainage area characteristics – Hydrographs – storage and Pondage – classification of dams and spill ways.

Hydro Projects and Plant: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants. Application of Hydro power plant, safety measures in Hydro power station, performance of water turbine, comparison of Hydro electric power plant and steam power plant.

UNIT – IV

NUCLEAR POWER STATION

Nuclear fuel – breeding and fertile materials – Nuclear reactor – reactor operation.

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

UNIT – V

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS

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

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 0 0 3

(A9342) DESIGN FOR MANUFACTURING

(PROFESSIONAL ELECTIVE-III)

Objectives:

- To understand various general design rules for manufacturing and criteria for material selection.
- To study various machining processes and tolerance aspects in machining.
- To know the design considerations for casting and welding processes.
- 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 Manufacturing – 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 Processes: Overview of various machining processes – general design rules for machining – Dimensional tolerance and surface roughness – Design for Machining ease – Redesigning of components for machining ease with suitable examples, General design recommendations for machined parts.

Unit-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 of forging – Closed die forging design – parting lines of dies – Drop forging die design – General design recommendations of 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.

VAAGDEVI COLLEGE OF ENGINEERING

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

3 0 0 3

(A9343) ROBOTICS

(PROFESSIONAL ELECTIVE-IV)

COURSE OBJECTIVES:

1. Students will be able to understand the concepts of robotics – classification by coordinate system and control system.
2. Students will be 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 Jacobean problems, Newton – Euler transmations.
5. Students will know about the actuators and feedback components, resolvers, encoders - velocity sensors.
6. Students will be 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 Industrial Robotics: Degrees of freedom – End effectors: Types of grippers: Mechanical, Magnetic, Vacuum cup – General considerations 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.Notation– 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 – Slew 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.

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 0 0 3

(A9344) COMPUTATIONAL FLUID DYNAMICS

(PROFESSIONAL ELECTIVE-IV)

COURSE OBJECTIVES:

1. Describe the physical significance of each term of the governing equations for CFD.
2. Use a commercial CFD package to solve practical CFD problems effectively.
3. Develop finite difference and finite volume discredited forms of the CFD equations.
4. Construct computer code to solve the Euler and Navier Stokes Eqns.
5. Create and demonstrate verification strategies for evaluating CFD code.
6. Understand different algorithms of different models.

UNIT – I

INTRODUCTION

Computational Fluid Dynamics as a Research and Design Tool, Applications

of Computational Fluid Dynamics.

Governing Equations of Fluid Dynamics: Introduction, Control Volume, Substantial

Derivative, Divergence of Velocity, Continuity Equation, Momentum Equation and Energy

Equation.

UNIT – II

MATHEMATICAL BEHAVIOUR OF PARTIAL DIFFERENTIAL EQUATIONS

Introduction, Classification of Quasi-Linear Partial Differential Equations, Eigen Value Method, Elliptic Equations, Parabolic Equations and Hyperbolic Equations.

UNIT – III

BASICS ASPECTS OF DISCRETIZATION

Introduction, Introduction of Finite Differences, Difference Equations, Explicit and Implicit Approaches, Errors and Stability Analysis, Convergence criteria and Grid Generation.

Incompressible Fluid Flow: Introduction, Implicit Crank-Nicholson Technique, Pressure

Correction Method, Computation of Boundary Layer Flow.\

UNIT – IV

HEAT TRANSFER

Finite Difference Applications in Heat conduction and Convention – Heat Conduction: Steady heat conduction, in a rectangular geometry, Transient heat conduction, Finite difference application in Convective heat transfer.

UNIT – V

FINITE VOLUME METHOD

Finite volume formulations for diffusion equation, convection diffusion equation. Solution algorithm for pressure velocity coupling in steady flows. Use of Staggered grids SIMPLE Algorithm and Introduction to Turbulence and Turbulence models.

COURSE OUTCOMES:

The students will be able to

1. Describe Governing equations of CFD.
2. Analyze problems with Euler and Navier Stokes Eqns.
3. Evaluate CFD codes.
4. Analyze different models with different algorithms.

TEXT BOOKS:

1. John D.Anderson, “Computational Fluid Dynamics: Basics with applications”, McGraw Hill 1st Ed., ISBN-13: 978-0070016859.
2. Tapan K.Sengupta, “Fundamentals of Computational Fluid Dynamics”, University Press, *ISBN*: 9788173714788.

REFERENCE BOOKS:

1. SuhasV.Patankar, "Numerical Heat Transfer and Fluid Flow", Butter-Worth Publishers, Hemisphere Publishing Company, New York 1st Ed., *ISBN Number*: 978-0891165224.
2. Muralidhar K, "Computational Fluid Flow and Heat Transfer", Narosa Publishing House 2nd Ed., ISBN No.: 9781842651728.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 0 0 3

(A9345) GAS DYNAMICS

(PROFESSIONAL ELECTIVE-IV)

Course objective:-

i) To know the Basic concepts of flows
ii) To analyze the concepts of flows
iii) To know about the one Dimensional, Two Dimensional, Quasi – one Dimensional flows
iv) To understand the concept of wave motions
v) To know the concepts of different types of wind Tunnels..

UNIT I

Basic concepts : Introduction to compressible flow, A brief review of thermodynamics and fluid mechanics, Integral forms of conservation equations, Differential conservation equations,

Continuum Postulates, Acoustic speed and Mach number, Governing equations for compressible flows.

UNIT II

One-dimensional compressible flow: One dimensional flow concept, Isentropic flows, Stagnation Total conditions, Characteristics speeds of gas dynamics, Dynamic pressure and pressure coefficients, Normal shock waves, Rankine-Hugonoit equations, Rayleigh flow, Fanno flow, Crocco's theorem.

UNIT III

Two-dimensional flows: Oblique shock wave and its governing equations, θ-B-M relations, The Hodograph and Shock Polar, Supersonic flow over wedges and cones, Mach line, Attached and Detached shock, Reflections and interaction of oblique shock waves, Expansion waves, Prandtl-Meyer flow and its governing equations, Supersonic flow over convex and concave corners, Approximation of continuous expansion waves by discrete waves.

UNIT IV

Quasi-one dimensional flows: Governing equations, Area velocity relations, Isentropic flow through variable-area ducts, Convergent-divergent (or De Laval) nozzles, Over-expanded and under-expanded nozzles, Diffusers.

UNIT V

Unsteady wave motions: Moving normal shock waves, Reflected shock waves, Physical features of wave propagation, Elements of acoustic theory, Incident and reflected waves, Shock tube relations, Piston analogy, Incident and reflected expansion waves, Finite compression waves, Shock tube relations.

Introduction to experimental facilities: Subsonic wind tunnels, Supersonic wind tunnels, Shock tunnels, Free-piston shock tunnel, Detonation-driven shock tunnels, and Expansion tubes.

TEXT BOOKS

S.M. Yahya, "Fundamentals of Compressible Flow", New Age International Publishers, 2004.

Zoeb Hussain, "Gas dynamics through problems ", WILEY EASTERN LTD.

REFERENCES

1. Gas dynamics- E. Radha Krishnan. P.H.I Publication, 2009.

2. H.W. Lipman and A. Rashkho, " Gas Dynamics", John Wiley, 1963.

3. Cambel and Jennings, "Gas Dynamics", McGraw Hill, 1958.

Course outcomes:-

i) Gain Knowledge on various concepts of flows.
ii) To gain knowledge on the one, two and Quasi – one dimensional flows.
iii) To gain knowledge on the wave motions.
iv) To gain knowledge on the Different types of Tunnels

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A9346) NON CONVENTIONAL ENERGY SOURCES

(PROFESSIONAL ELECTIVE V)

IV Year B.Tech. I-Sem

L	T	P	C
3	0	0	3

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 Biogas 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 and 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.

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

****

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

VAAGDEVI COLLEGE OF ENGINEERING

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

3 0 0 3

(A9347) MECHANICAL VIBRATIONS

(PROFESSIONAL ELECTIVE-V)

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-I:

Single Degree of Freedom System: Undamped and damped free vibration; 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-II:

Two Degree Freedom Systems: Principal modes- undamped and damped free and forced vibrations; undamped vibration absorbers.

UNIT-III:

Multi Degree Freedom Systems: Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by model analysis; Method of matrix inversion; Torsional vibrations of multi-rotor systems and geared systems; Discrete-Time systems.

UNIT-IV:

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.

REFERENCE BOOKS:

1. Mechanical Vibrations/Vp Singh/Danapathi Rai & Sons.
2. Mechanical Vibrations/SS Rao/Pearson,2009/4thEdition.
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/Ravised 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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 0 0 3

(A9348)AUTOMATION IN MANUFACTURING

(PROFESSIONAL ELECTIVE-V)

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 and 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.

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

L	T	P	C
0	0	3	2

(A9349)CAD/CAM LABORATORY

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.

1. Drafting: Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script.

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 axisymmetric 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. Through RS 232

   f) Quality Control and inspection.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

0 0 3 2

(A9350)PRODUCTION DRAWING PRACTICE& INSTRUMENTATION AND CONTROL SYSTEMS LAB

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, electronic, 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 from and position on drawings, Types of run out, total run out and their indication.

UNIT – III

SURFACE ROUGHNESS AND ITS INDICATION

Definition, Types of surface roughness indication- surface roughness 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

Drawinof parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

UNIT – V

PRODUCTION DRAWING PRACTICE

Part drawings using computer aided drafting by CAD software.

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.

INSTRUMENTATION AND CONTROL SYSTEMS LAB

(Any Six 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 Rota meter 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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 1 0 3

(A9352) PRODUCTION PLANNING & CONTROL

(OPEN ELECTIVE-III)

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.

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

IV Year B.Tech. Mech. Engg. II-Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

(A9353) RELIABILITY ENGINEERING

(OPEN ELECTIVE-III)

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).

UnitIV

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.

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

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 1 0 3

(A9006) OPERATIONS RESEARCH
(OPEN ELECTIVE-III)

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

IV Year B.Tech. Mech. Engg. II-Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

(A9354) CNC TECHNOLOGIES

(PROFESSIONAL ELECTIVE – VI)

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, 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.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

a. Understand the basic procedures and concepts of programming, set up and operation of a CNC Machining Center.

b. Identify and understand the basic programming codes.

c. Create geometry and tool paths from the specifications on a blueprint for simple parts using Master cam programming software.

d. Identify and define the functions of the CNC machine control. e. Set up the CNC machining center for manufacturing simple parts f. Manufacture simple parts on the CNC machining center.

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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

3 1 0 3

(A9355) PLANT LAYOUT & MATERIAL HANDLING

(PROFESSIONAL ELECTIVE – VI)

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.

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.

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.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(A9356) JET PROPULSION & ROCKET ENGINEERING
(PROFESSIONAL ELECTIVE – VI)

IVYear B.Tech. Mech. Engg. II-Sem **L T P C**
3 1 0 3

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 – serque jet and pulse jet, 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.

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.

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