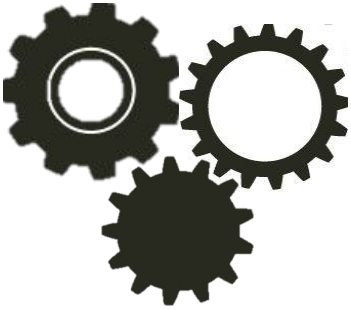
With effect from the year 2018-19

VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
Ibrahimbagh, Hyderabad-31

Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SYLLABI UNDER CBCS FOR
B.E V& VI SEMESTERS OF MECHANICAL ENGINEERING
WITH EFFECT FROM 2018-19
(For the students admitted in 2016-17)



DEPARTMENT OF MECHANICAL ENGINEERING

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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION FOR BE V-SEMESTER w.e.f. 2018-19 under CBCS
(Students admitted in 2016-17)

S.NO.	Course Code	Course	Scheme of Instruction				Scheme of Examination			Credits
			Hrs / week				Duration in Hrs	Maximum Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	HS500EH	Economics and Finance for Engineers	2	1	0	0	3	70	30	2
2	PC510ME	Hydraulic Machinery	3	0	0	0	3	70	30	3
3	PC520ME	Machine Design	3	2	0	0	3	70	30	4
4	PC530ME	Finite Element Analysis	3	0	0	0	3	70	30	3
5	PC540ME	Manufacturing Processes	3	0	0	0	3	70	30	3
6	MC500EH	Human Values and Professional Ethics – II	1	0	0	0	2	50	30	1
7	HS510EH	Finishing School -III: Soft Skills	1	1	0	0	1.5	35	15	1
8	MC510ME	Finishing School - III: Technical Skills	1	1	0	0	1.5	35	15	1
9	OE5XXXX	Open elective-IV	1	0	0	0	2	50	30	1
10	OE5XXXX	Open elective-V	2	0	0	0	3	70	30	2
PRACTICALS										
11	PC511ME	Fluid Mechanics &Hydraulic Machinery Lab	0	0	0	2	3	50	25	1
12	PC541ME	Manufacturing Processes lab	0	0	0	2	3	50	25	1
13	PW519ME	Mini Project	0	0	0	2	0	0	50	1
		Total	**20**	**5**	**0**	**6**	**0**	**690**	**370**	**24**
		Grand Total	**31**					**1060**		

With effect from the year 2018-19

DEPT. OF H&SS
B.E-V SEMESTER
ECONOMICS AND FINANCE FOR ENGINEERS

Instruction: 2+1Hrs/week	**SEE Marks:** 70	Course Code: HS500EH
Credits: 2	**CIE Marks**:30	**SEE:** 3 hrs.

Course Objectives	Course Outcomes
The objective of the Course is to equip the prospective engineers with the concepts and tools of economics, finance, cost and taxes for business decisions.	1. Decide appropriate price for goods and services with the company's given cost structure for an estimated profit of the companies. 2. Analyze the given financial statements of a firm to understand its past financial performance in the market. 3. Compare the long term financial investment proposals to decide whether a proposal is financially viable or not through capital budgeting techniques. 4. Identify the suitable sources of finance for the company by considering the functions of major banks such as SBI and RBI 5. Calculate the impact of the new tax policies on the company's financial structure/ individual incomes.

Unit I:**Basics of Economics:**
Scarcity Definition of Economics - Macro and Micro Economics - Managerial Economics - Meaning of a Firm - Objectives of a Firm - Profit Maximization - Demand Concept -Price Elasticity of Demand -Meaning of Supply -Equilibrium Price and Quantity -Production -Cobb Doughlas Production Function - Economies of Scale.

Unit II: **Cost and Price:**
Cost - Meaning -Classification of Costs -Short run and Long run costs - Cost Sheet - Break even Analysis - Methods of Pricing (Problems on Cost Sheet, Breakeven Analysis and Methods of Pricing can be asked).

Unit III: **Banking & Finance:**
RBI and its role -Commercial Banks - Functions -Capital Budgeting - Discounting and Non discounting Techniques- Working Capital Management - Concepts and Components of Working Capital - Operating Cycle.

UNIT IV: **Understanding Financial Statements:**
Financial Statements- Meaning - Types -Purpose – Ratios (Liquidity, Solvency & Profitability Ratios)(Problems can be asked on Ratios)

Unit V: **Direct & Indirect Taxes:**
Heads of Income - Income from Salaries - Income from House Property - Income from Business - Income from Capital Gains -Income from Other Sources - Latest Tax Rates - GST -CGST - SGST - IGST - GST network.

Learning Resources:
1. S.P.Jain and K.LNarang., "Cost Accounting", Kalyani Publishers, Twentieth Edition Revised– 2008.
2. S.P.Jain and K.L Narang., "Financial Accounting", Kalyani Publishers – 2002.
3. Mehta P.L.,"Managerial Economics: Analysis, Problems and Cases", Thirteenth Edition, Sultan Chand and Sons, Nineteenth Edition - 2013.
4. M.Y.Khan and P.K. Jain., "Financial Management – Text, Problems and Cases", Mc Graw Hill Education Private Limited, New Delhi.
5. Vinod KSinghania and Kapil Singhania., "Direct Taxes Law and Practice", Taxmann Publications, Sixtieth Edition - 2018.
6. Dr,Vinod K Singhania., "Students' Guide to GST and Customs Law", Taxmann Publications, Edition - 2018.
7. Muralidharan., "Modern Banking", Prentice Hall of India.

Reference Books:
1. *M. L. Seth., "Micro Economics",* Lakshmi Narain Agarwal.
2. Dr. R.P. Rustagi., "Fundamentals of Financial Management" Taxmann Publications.
3. Dr. D.M. Mithani, "Money Banking International Trade & Public Finance", Himalaya Publishing House - 2014.
4. Rajesh., "Banking Theory and Practice", Tata Mc Graw Hill Publishing

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
HYDRAULIC MACHINERY

Instruction :3 Hours /week	SEE Marks :70	Course Code : PC510ME
Credits : 3	CIE Marks :30	Duration of SEE :3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: understand the application of hydrodynamic forces on vanes, calculate the parameters for design of hydraulic machines and estimate their performance. Also to design basic hydraulic circuit using various types of valves and pumps.	On completion of the course, the student will be able to: 1. apply basic principles to understand effect of hydrodynamic forces on various types of vanes. 2. estimate the performance of reciprocating pumps under various operating parameters. 3. design and analysis of centrifugal pump and draw characteristic curves under various speeds. 4. design and estimate the efficiency of turbines with study of characteristic curves under various operating heads 5. justify the use of different types of fluid control valves to draw hydraulic circuits.

UNIT-I

Impact of Jets: Basic principle: Impulse momentum equation– Impact of jet on vanes – Force exerted by a jet striking on a stationery (i) flat vertical plate. (ii)inclined plate. (iii) curved plate. – Force exerted by a jet striking on a moving plate (in the direction of the jet) and work done on (i) vertical plate. (ii) inclined plate. (iii) symmetrical curved plate. Force exerted by a jet striking an unsymmetrical moving curved plate when jet strikes tangentially at one of the tips. Force exerted by a jet striking a series of vanes and on series of radial curved vanes.

UNIT-II

Hydraulic Turbines: Layout of hydraulic power plant – Working principle. Classification of impulse and reaction turbines – Construction and working of Pelton wheels, Francis turbine and Kaplan turbine – Velocity triangles – Work done (power developed) – Hydraulic, Mechanical and Overall efficiencies – Maximum efficiency – Comparison between Impulse and reaction turbines – Comparison between Pelton,

Francis and Kaplan turbines – Specific speed – Physical significance of specific speed – Unit quantities – Model testing of turbines – Conditions for similarity of turbines – Draft tubes – functions and types of draft tubes – Surge tanks – Functions and types of surge tanks – Performance characteristic curves.

UNIT-III

Centrifugal pumps: Classification – Working principle – Comparison over reciprocating pumps – Velocity triangles – Manometric head – Work done per second – Head equivalent of work done – Manometric, mechanical and overall efficiencies – Pressure rise in the impeller – Minimum starting speed – Specific speed – Physical significance of specific speed – Model testing – Conditions of similarity of CF pumps – Priming of pumps. – Performance characteristic curves. Cavitation – Effects & Precautions of Cavitation.

UNIT-IV

Reciprocating Pumps: Classification, working principle-single and double acting pumps-discharge, work done and power required to drive the pumps-slip, % slip and negative slip- variation of pressure head in the Suction and delivery pipes due to acceleration of piston- variation of pressure head due to friction in the suction and delivery pipes. Indicator diagrams- Ideal and actual diagrams –Effect of piston acceleration and pipe friction on indicator diagram- Maximum speed at which the pump must run to avoid separation during suction and delivery strokes-Air vessels- Function of air vessels- Work saved by fitting air vessels to single and double acting pumps – Discharge of liquid into and out of air vessels-Performance characteristic curves.

UNIT-V

Definition of fluid power, hydraulics verses pneumatics, applications in industry, Pascal's Law and its applications, basic components of hydraulic circuits, properties of hydraulic fluids, basic symbols, types of oil tanks, filters, introduction to directional control valves – check valves, shuttle valves, two way valve and three way valve, introduction to pressure reducing valves, hydraulic cylinders, hydraulic pumps – gear, lobe, vane pumps. Introduction to basic hydraulic circuit design, control of single acting hydraulic cylinder, double acting hydraulic cylinder.

Learning Resources:

1. Som, S.K., Biswas, G. and Chakraborty, S., "Fluid Mechanics and Fluid Machines", 3rd edition, McGraw-Hill, 2012.
2. Dixon, S.L., "Fluid Mechanics and Thermodynamics of Turbomachines", 4th edition, Butterworth Heinemann, 1998.
3. Kadambi, V. and Manohar Prasad, "An Introduction to Energy Conversion Vol.III: Turbomachinery", Wiley Eastern, 1997.
4. D.S Kumar, "Fluid Mechanics and Fluid Power Engineering" 8th edition, S.K Kataria& Sons, 2014
5. Majumdar,S.R.,"Oil Hydraulic Systems – Principles and Maintenance",TataMcGraw-Hill,2004

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
MACHINE DESIGN

Instruction : 3+2Hrs/Week	SEE Marks : 70	Course Code : PC520ME
Credits : 4	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: Design mechanical components such as springs, gears, bearings, IC engine parts and curved beams	On completion of the course, the student will be able to 1. design of helical and leaf springs under direct and eccentric loading for various applications. 2. design of gears under strength and wear conditions for power transmission. 3. design and select sliding and rolling contact bearings for supporting shafts /axles 4. estimate the stresses in I.C. Engine parts under strength and thermal loading conditions. 5. estimate and propose a curved beam for machine frames, C -clamps and crane hook under pure bending condition.

UNIT – I

Mechanical Springs: Types of springs and Materials used. Design of Helical Springs based on stress, deflection and energy considerations. Concentric springs. Leaf springs: Stresses and deflection. Nipping of leaf springs.

UNIT – II

Gears: Types of gears and materials used. Standards for gear specifications. Design of spur, helical, bevel and worm gears – strength and wear considerations. Types of failure of gear tooth and preventive measures.

UNIT – III

Bearings: Materials used for Bearings, Classification of bearings. Viscosity of Lubricants. Theory of Hydrostatic and Hydrodynamic lubrication. Design of sliding contact bearings – for axial and thrust loads.

Rolling Contact Bearings: Different types of rolling element bearings and their constructional details. Static dynamic load carrying capacity, Load– life relationship, Design for cyclic loads, Selection of bearings using data book.

UNIT– IV

I.C. Engine Parts: Design of piston, connecting rod and crank shafts (single throw and overhang).

UNIT – V

Bending of members with initial curvature – rectangular, circular and trapezoidal sections. Design of crane Hooks, machine frames and C-clamps.

Learning Resources:

1. M.F. Spotts, "Design of Machine Elements", 7th ed., Pearson Edu, 2003
2. V.B. Bhandari, "Machine Design", Tata McGraw–Hill Publications, 2010
3. P.C. Sharma & D.K. Aggarwal, "Machine Design", 10th ed., S.K. Kataria& sons, , 2003
4. J.E. Shigley, C.R. Mischke, RGBudynas "Mechanical Engineering Design", 6th ed., Tata McGraw Hill Publications, 2003.
5. NC Pandya and CS Shah, "Machine Design" Charotar publishing House, 2006

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
FINITE ELEMENT ANALYSIS

Instruction : 3Hrs/Week	SEE Marks : 70	Course Code : PC530ME
Credits :3	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: understand the concept of FEA and apply it to 1-dimensional and 2-dimensional problems in the field of Mechanical Engineering.	At the end of the course, students shall be able to: 1. understand the shape functions and formulate the finite element equations for 1-D elements. 2. evaluate the deflections, stresses and strains for trusses and beams. 3. solve two dimensional problems for their deflections, stresses and strains. 4. evaluate one dimensional steady state heat transfer models. 5. estimate the dynamic behaviour of structural members and obtain the natural frequencies and mode shapes.

UNIT-I

Introduction to Finite Element Method, stress and Equilibrium, Strain, displacement, stress– strain relations.

One dimensional problems:

Finite element modelling coordinates and shape functions, Potential Energy approach, assembly of Global stiffness matrix and load vector, Finite element equations, Penalty approach, introduction to quadratic shape functions.

UNIT – II :Analysis of trusses and beams:

Element stiffness matrix for a plane truss member. Analysis of plane trusses, element stiffness matrix for a 2D-beam member (one rotation and one translation at each node), analysis of 2D beams. steady state one dimensional heat transfer analysis of composite wall and a fin.

UNIT – III: Two dimensional problems:

Element stiffness matrix for constant strain triangle element (CST), two dimensional stress analysis using CST elements and treatment of boundary conditions, introduction to Finite element modelling of axi–symmetric solids, two dimensional four nodediso–parametric elements.

UNIT – IV

Introduction of Finite Element analysis software: Pre-processing, processing, post processing.

Requirements of the position of the nodes, mesh requirements, type of elements and their degrees of freedom, convergence requirements.

Numerical integration using Gaussian Quadrature with two and three point formulae,

UNIT – V

Dynamic Analysis: Formulation of finite element model, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam,

Learning Resources:

1. Tirupathi R, Chandraputla and Ashok D Belagundu, "Introduction to finite elements in engineering", Prentice Hall of India, 1997.
2. G.Ramamurthy, "Applied Finite Element Analysis", I.K. International Publishing House Pvt. Ltd., New Delhi. 2009.
3. Rao S S, "The Finite Element Method in Engineering", Pergamon Press, 1989.
4. Segerlind L J, "Applied Finite Element Analysis", Wiley Eastern, 1984
5. Reddy J N, "An Introduction to Finite Element Method", McGraw– Hill, 1984

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

MANUFACTURING PROCESSES

Instruction : 3Hrs/Week	SEE Marks : 70	Course Code : PC540ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: study the casting & special casting processes , welding & special welding processes, forming and special forming processes.	*On completion of the course, the student will be able to:* • design riser and gating system to produce required casting in sand moulding process. • examine special casting processes to suit various production requirements based on applications. • understand the techniques of solid state and arc welding processes to join different materials. • identify and select special welding process based on the application. • interpret and differentiate various forming processes based on component to be manufactured.

UNIT-I

Casting Process: Casting terms, pattern materials, types of patterns, pattern allowances, colour code for patterns, Moulding sands, core sands, properties of moulding sand and its ingredients, different types of moulding machines, Directional solidification, use of chaplets, chills, riser and gating design.

UNIT-II

Special Casting Processes: Shell moulding, Co2 moulding, die casting, centrifugal casting, investment or lost wax process; Casting defects, causes and remedies, Inspection and testing of casting. Processing of plastics - Extrusion, Injection moulding, Blow moulding and Thermoforming.

UNIT-III

Welding Processes: Solid state welding processes - Friction welding, Forge welding, Explosive welding and ultrasonic welding, Gas welding, Arc welding- SMAW, SAW, GMAW, GTAW, PAW, Atomic hydrogen welding, Welding defects, principle of Soldering and Brazing.

UNIT-IV

Special Welding Processes: Laser beam welding, Electron beam welding, Thermit welding, and Electro slag welding. Resistance welding processes - Spot welding, Projection welding, Seam welding, Butt welding, weldability.

UNIT-V

Forming Processes: Cold & Hot working, Yield criteria, Process description of Forging, Rolling, Extrusion, Wiredrawing, Blanking, Piercing, Bending, Deep drawing, Stretch forming, Spinning. Introduction to unconventional forming processes-Explosive forming, Electro-magnetic forming, Electro-hydraulic and rubber pad forming.

Learning Resources:

1. P.N.Rao, *"Manufacturing Technology,"* Vol. 1, 3rd Ed., Tata McGraw Hill Publ., 2011.
2. Amitabh Ghosh &Mallick, *"Manufacturing Science",* 4th Ed., Assoc. East west Press Pvt. Ltd., 2011.
3. Roy A. Lindberg, *"Materials & Process of Manufacturing",* 5th Ed., Prentice Hall of India, l992.
4. SeropeKalpakjian, *"Manufacturing Engineering and Technology",* Addison, Wesley Publishing Company, 2006
5. George.E. Dieter, *"Mechanical Metallurgy",* McGraw-Hill Book Company, 1988

SYLLABUS FOR B.E. VI SEMESTER
HUMAN VALUES AND PROFESSIONAL ETHICS – II

Instruction: 1 Hrs /week	SEE Marks :35	Course Code :**MC500EH**
Credits : 1	CIE Marks: 15	Duration of SEE : 2 Hrs

Course Objectives	Course Outcomes
1. Get a holistic perspective of value- based education. 2. Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations. 3. Understand professionalism in harmony with self and society. 4. Develop ethical human conduct and professional competence. 5. Enrich their interactions with the world around, both professional and personal.	**At the end of the course, students will be able to:** 1. Gain a world view of the self, the society and the profession. 2. Make informed decisions. 3. Start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals 4. Inculcate Human values into their profession. 5. Validate their aspirations through right understanding of human relationship and see the co-relation between the human values and prevailing problems. 6. Strike a balance between physical, mental, emotional and spiritual parts their being. 7. Obtain a holistic vision about value-based education and professional ethics.

UNIT-I

A. **DISTINCTION BETWEEN NEED AND GREED**
Exercising the wisdom to distinguish need from greed.

B. **IDEAL SELF-REAL SELF**-
How to define the ideal-idealism at various levels- is it possible to reach idealism –Man as a pilgrim on a journey to idealism.

UNIT – II

A. **RIGHTS AND RESPONSIBILITIES**-Educating an individual about rights and responsibilities –Safeguards-Stimulants-Social Justice-The three catalysts for deciding rights and responsibilities.

B. **IMBIBING AND INCULCATING CIVIC SENSE AND CIVIC-VIRTUES**, The true meaning of Integrity -Honesty, Humility, Openness, Transparency, Dedication, Reliability, Confidentiality, accountability, Collegiality, Sympathy, Trustworthiness, Co-operation, Courage.

a. The moral dilemma of the Modern world, Respect for Self, Others and Work.
b. Respect for women at the workplace.

UNIT - III

MANAGING FAILURE-Identifying causes for failure and learning lessons-Using failure to score success-Role of self-confidence and personal ethics in coping with failure.

• Anger/ Depression • Fear • Agitation • Failure • Lethargy • Dishonesty	• Cruelty • Jealousy • Desire • Cheating • Pride • Greed • Lying

UNIT - IV

STRESS MANAGEMENT- Identifying sources and levels of stress – Tackling stress and its associated negativity-Positive aspect of coping with stress- Some techniques to manage stress.

UNIT - V

DEVELOPING EMOTIONAL INTELLIGENCE

Self-Awareness
Handling Emotions
Motivation
Empathy
Social skills

Suggested Readings:

1. B.L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. A.N Tripathy, 2003 Human values, New Age International Publishers.

3. EG Seebauer& Robert L. Berry,2000,Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
4. Mike Martin and Ronald Schinzinger "Ethics in Engineering "McGraw Hill
5. Charles E Haris, Micheal J Rabins, " Engineering Ethics "Cengage Learning
6. Caroline whitback, Ethics in Engineering Practice and Research, Cambridge University Press
7. Georgs Reynolds, Ethics in Information Technology", Cengage Learning
8. Charles D.Fleddermann, " Engineering Ethics", Pearson Education /Prentice Hall, New Jersey,2004 (Indian Reprint)

Online Resources

1. Value Education website, Http://www.universalhumanvalues.info
2. UPTU website, Http://www.uptu.ac.in
3. story of stuff, Http://www.storyofstuff.com
4. AlGore, As Inconvenient Truth, Paramount Classics ,USA
5. Charlie Chaplin, Modern Times, United Artists, USA
6. IIT Delhi, Modern Technology-The Untold story
7. Anand Gandhi, Right Here Right Now, Cyclewala production

SYLLABUS FOR B.E.- V SEMESTER
FINISHING SCHOOL – III : SOFT SKILLS

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code :**HS510EH**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objectives	Course Outcomes
1. This is a foundation course and aims at enhancing employability skills in students. Students will be introduced to higher order thinking skills and problem solving on the following areas - Arithmetic ability, Numerical ability and General reasoning. Students will be trained to work systematically with speed and accuracy while problem solving. 2. The three major areas covered in this course include 1. Numerical Ability 2. Arithmetic Ability 3. General reasoning	**At the end of the course, students will be able to:** 1. Solve questions on the above mentioned areas using short cuts and smart methods 2. Understand the fundamentals concepts of Aptitude skills 3. Perform calculations with speed and accuracy

UNIT – I : QUANTITATIVE APTITUDE - NUMERICAL ABILITY

- Numerical Ability
- Introduction to higher order thinking skills
- Speed Maths
- Number systems
- LCM & HCF

UNIT – II : QUANTITATIVE APTITUDE-ARITHMETIC ABILITY FOUNDATION

- Arithmetic Ability
- Percentage
- Profit loss and discounts
- Ratio proportions Allegations and mixtures
- Averages

UNIT – III : QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED

- Arithmetic Ability
- Time speed and distance
- Time and work
- Interest calculations

UNIT – IV : REASONING ABILITY– GENERAL REASONING PART 1

- General Reasoning
- Coding decoding
- Directions
- Series completions

UNIT – V : REASONING ABILITY- GENERAL REASONING PART 2

- General Reasoning
- Analogies
- Classification
- Alphabet test
- Mathematical operations

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR BE V-SEMESTER
FINISHING SCHOOL-III : TECHNICAL SKILLS

Instruction :1+1 Hours/week	SEE Marks :35	Course Code : MC510ME
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: formulate script files and plots using MATLAB and develop programs and solve differential equations.	On completion of this course, students will be able to: • utilise MATLAB for mathematical operations using built-in functions. • formulate matrices for solution of equations using MATLAB. • develop 2-D plots using MATLAB for graphical representation. • develop programs using conditional statements • solve differential equations using MATLAB

UNIT –I

Starting a Computational tool and its windows, Working in Command Windows, Working with Arithmetic operations with scalars, order of preference, using computational tool as a calculator, Display of formats, Elementary Math-building functions, Assignment operators, rules about variables, Examples of computational tool applications, Problems.

UNIT-II

Creating Arrays and matrices, matrix operations, Examples of Applications.

UNIT III

Script files, Creating, saving and running a script file, Global variables, input and output commands. 2D plots, Plots with special graphics, multiple plots, examples. Creating a function file, running function file, feval command, examples and mathematical applications.

UNIT IV

Progamming using computational tool, conditional statements, loops, nested loops, Examples, Polynomials, curve fitting and interpolation, Examples and Applications, 3D plots, line plots, mesh and surface plots, plots with special graphics., view command, Examples.

UNIT-V

Differentiation and integration, Solving ordinary Equations with one variable, Finding minimum and maximum of a function, Numerical integration, solving Ordinary differential equations, Non-linear equations.

Mathematical modelling and simulation of mechanical systems using simulation tool.

Hydraulics and vibration controls etc simulated using the simulation tool.

Learning Resources:

1. Agam Kumar TyagI, *"MATLAB and Simulink for Engineers*", Oxford Higher Education, 2010
2. RudraPratap, " *Getting started with MATLAB"* , Oxford University Press, 2010
3. Amos Gilat, "Matlab – An introduction with applications", Wiley India, 2012
4. Stevan C Chapra, "Applied Numerical Methods with Matlab for Scientists and Engineers". Tata McGraw- Hill, 2010

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
FLUID MECHANICS& HYDRAULIC MACHINERY LAB

Instruction : 2Hrs/Week	SEE Marks :50	Course Code : PC511ME
Credits :1	CIE Marks: 25	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course is to: provide practical knowledge in verification of principles of fluid flow while imparting knowledge in measuring pressure, discharge and velocity of fluid flow. Also gain knowledge in performance testing of Hydraulic machines.	On completion of the course, the student will be able to 1. Determine the coefficient of impact on semi circular vane under constant jet velocity. 2. Evaluate the performance of impulse turbine under various gate openings. 3. Estimate the performance of reaction turbines under various gate openings 4. Calculate the efficiency of non-positive displacement pumps under variable speed. 5. Calculate the efficiency of positive displacement pump operating at various speeds.

1. Determination of type of flow by Reynolds apparatus.
2. Verification of Bernoulli's Equation for an incompressible flow.
3. Determination of discharge coefficient of venture meter
4. Determination of discharge coefficient of orificemeter.
5. Determination of friction factor in pipe flow.
6. Determination of impact coefficient of jet on given vane.
7. Performance characteristics curves of a Pelton wheel at constant head.
8. Performance characteristics curves of a Francis Turbine at constant head.
9. Performance characteristics curves of a Kaplan Turbine at constant head.
10. Performance characteristics curves of a centrifugal pump at constant speed / variable speed.
11. Performance characteristics curves of a self priming pump at constant speed.
12. Performance characteristics curves of a reciprocating pump at constant speed.
13. Performance characteristics curves of a gear pump at constant speed.
14. Study of Pneumatic/hydraulic circuits.

Note: Minimum twelve experiments to be completed.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E.V-SEMESTER
MANUFACTURING PROCESSES LAB

Instruction : 2 Hrs/week	SEE Marks : 50	Course Code : PC541ME
Credits : 1	CIE Marks: : 25	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: • design and manufacturing of sand castings and to study defects of casting. • understand welding principles, types of welding methods and welding defects. • study different forming processes	On completion of the course the student will be able to: 1. design and prepare mould cavity and determine time taken for solidification. 2. evaluate efficiency & performance characteristics of arc welding & gas Welding operations. 3. calculate the Ericsson number & Designing metal Forming Dies for forming operations 4. understanding and reasoning various Casting, Forming & welding defects

Foundry

1. Single piece pattern making with wood as material considering allowances (Draft, Shrinkage and Machining)
2. Green sand mould making processes with complete sprues, gates, riser with design.
3. Testing of green sand properties
4. Melting and casting of aluminium metal and Study of defects in castings by DP test
5. Preparation of shell for Shell moulding process.

Welding

1. Identification of different types of flames and making a butt joint with gas welding.
2. Making a lap joint by resistance welding process and strength evaluation.
3. Analysis of bead geometry using AC and DC welding processes.
4. Demo of TIG and MIG welding processes.
5. Exercise on submerged arc welding.

Forming

1. Evaluation of formability using Erichsen cupping test.
2. Design study of simple dies and performing blanking and piercing operations using mechanical/ fly presses and measurement of forces in the operation and comparing with the theoretical loads.
3. Study of simple, compound and progressive dies and making simple components.
4. Study of process parameters for injection moulding.

Note: Minimum twelve experiments to be completed.

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

MINI PROJECT

Instruction : 2 Hrs /week	SEE Marks : ---	Course Code : PW519ME
Credits : 1	CIE Marks: : 50	Duration of SEE: -

Course objectives	Course Outcomes
The objective of this course is to: enable the student to take up investigative study in the field of mechanical engineering.	On completion of the course the student will be able to: 1. choose appropriate field of interest 2. Plan the activities for carrying out the work in teams 3. develop the capability to conduct investigations on the chosen problem 4. defend the work carried out

The mini project can be assigned on individual basis or in a group consisting of maximum 3 students/ batch.

The students are required to identify the topic of their interest and collect data / literature in core areas of thermal, design and analysis, manufacturing and industrial engineering. The students need to identify a problem and work in that area in consultation with the project guide. The output may be in terms of a small prototype or conducting investigations through experiments or evaluate theoretically using modern tools of mechanical engineering such as CAD/CAM, FEA,CFD or prepare a review of the existing state-of-the-art.

The students are required to submit a project report containing the abstract and the summary of the work in terms of plots or fabricated models or a technical report and submit for evaluation.
The students are required to give a oral presentation/ demo of prototype before the departmental committee for evaluation.

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN
B.E- V and VI SEMESTER (2018-19)

Engineering Branches

Open Elective IV (Semester - V)			
Dept.	**Title**	**Code**	**credits**
Civil	Environmental Impact Assessment	OE510CE	1
	Remote Sensing	OE520CE	1
CSE	Introduction to Software engineering	OE510CS	1
ECE	Introduction to Telemetry	OE510EC	1
EEE	Basics of power systems	OE510EE	1
IT	Introduction to Linux	OE510IT	1
Mech.	Basics Of 3-D Printing	OE500ME	1
Open Elective V (Semester - V)			
Civil	Global Positioning Systems	OE530CE	2
	Project Management	OE540CE	2
CSE	Introduction to Java Programming	OE520CS	2
ECE	Introduction to Signal Processing	OE520EC	2
EEE	Fundamentals of Power Electronics	OE520EE	2
IT	Introduction to Java Programming Language	OE520IT	2
Mech.	Introduction to Robotics	OE510ME	2
	Basics Of Entrepreneurship	OE520ME	2

Basic Sciences and H&SS

Open Elective IV (Semester - V)			
Dept	**Title**	**Code**	**credits**
CHEM	Electronic Engineering Materials	OE400CH	1
	Polymer Technology	OE410CH	1
	Industrial Pollution Prevention and Control	OE420CH	1
	Electrochemical Energy Systems	OE430CH	2
	Corrosion Science and Technology	OE440CH	2
PHY	Display Devices	OE400PH	1
	Fundamentals of Vacuum Technology	OE410PH	1
	Introduction to Non-destructive Testing	OE420PH	1
	Fundamentals of Cryogenics	OE430PH	2
	Smart Materials and Applications	OE440PH	2
	Fundamentals of Thin Film Technology	OE450PH	2
ENG	Technical Writing and Professional Presentations	OE510EH	2

With effect from the year 2018-19

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE V-SEMESTER
ENVIRONMENTAL IMPACT ASSESSMENT (Open Elective – IV)

Instruction: 1 Hr /week	SEE Marks :50	Course Code :OE510CE
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to introduce	*Upon the completion of the course, students are expected to*
1. The issues, impact and management plan due to Environmental of the project	1. Apprise the need, legal provisions and 2 Enumerate the methods of Environmental Impact Assessment. 3. Predict the impact and prepare the management plan for Environmental issues of the project 4. Issues related to rehabilitation of affected people, Preparation of Environmental impact statement

UNIT-I

Environmental Impact Assessment: Need for environmental impact assessment (EIA), objectives of EIA. EIA capabilities and limitations. Legal provisions of EIA. Methods of EIA, base line data collection required for EIA

UNIT-II

Evaluation of impacts: Prediction of impacts. Preparation of Environmental Management Plan, preparation of EIAs of road project, Industry, and dam. Issues related to rehabilitation of affected people, Preparation of Environmental impact statement and Environment management plan.

Learning Resources:

1.Peavy and Rowe, *Environmental Engineering,* McGraw Hill Publications.
2.Keiley, *Environmental Engineering,* McGraw Hill Publishers, 2003.
3.Sincero and Sincere, *Environmental Engineering,* Prentice Hall of India.

Online Resources

1.http://nptel.ac.in/courses/

With effect from the year 2018-19

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
REMOTE SENSING (Open Elective – IV)
(to other branches)

Instruction: 1 Hr /week	SEE Marks :50	Course Code : OE520CE
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to	*Upon the completion of the course, students are expected to*
1. Provide fundamental knowledge on geo spatial technology such as remote sensing	1. Explain the basic principles of remote sensing to analyse the surface features on the Earth. 2. Describe the characteristics of satellites, platforms & sensors used in acquisition of remote sensing data required for further processing. 3. Identify and correct the remotely sensed data for atmospheric, radiometric and geometric errors to produce a high quality image. 4. Apply the principles and techniques of remote sensing to solve various problems in engineering field.

UNIT-I

Introduction: Definition, Elements of remote sensing, Physics of remote sensing, Sources of Energy, Active and Passive Radiation, Types of remote sensing, Electromagnetic spectrum and radiation, Interaction with Atmosphere, Atmospheric windows, Spectral reflectance of Earth's surface features

Data Acquisition: Satellite orbits and characteristics, various types of platforms, Sensor types & characteristics, Types of resolution-spatial, spectral, radiometric &temporal

UNIT-II

Data Pre-processing: Atmospheric errors and removal, Radiometric corrections, Geometric corrections, Geo-referencing, re-sampling methods - Basic Principles of Visual Interpretation

Applications: Applications of optical remote sensing techniques in various fields of Engineering

Learning Resources:

1. Anji Reddy M., Remote Sensing and Geographic Information System, 2012
2. John A. Richards, Remote sensing Digital Image Analysis, 2012

With effect from the year 2018-19

DEPARTMENT OF CIVIL ENGINEERING

GLOBAL POSITIONING SYSTEM (Open Elective–V)

(to other branches)

Instruction: 2 Hr /week	SEE Marks :70	Course Code :OE530CE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to	*Upon the completion of the course, students are expected to*
1. To provide fundamental knowledge on geo spatial technology such as GPS	1. Describe the fundamental theory and concepts of the Global Positioning System to provide 3D positioning with great accuracy. 2. Compute errors and biases in GPS measurements and apply necessary corrections to obtain accuracy as per the user specifications. 3. Describe the differences between point and relative GPS positioning, 4. Analyse DGPS and RTK surveys used to obtain GPS measurements in the field.

UNIT-I

Overview of GNSS and Introduction to GPS, GLONASS, GALILEO, COMPASS, IRNSS systems

GPS: Basic concepts, Functional system of GPS – Space segment, control segment and user segment, Working principle of GPS, Signal structure and code modulation, Pseudo-range measurements and navigation position

UNIT-II

Errors and biases in GPS measurements, Accuracy of navigation position: UERE and DOP, Intentional degradation of GPS signals: Selective availability (SA) and Anti-spoofing (AS)

Differential GPS: Space based augmentation systems (e.g., SBAS, GAGAN) and Ground based augmentation systems (e.g., WASS, EGNOS)

UNIT-III

GPS Carrier Phase measurements: Signal Differencing, Double Differencing and Triple Differencing in GPS measurements.

UNIT-IV

Surveying with GNSS: Point positioning, Relative positioning, Static and Kinematic positioning.

GNSS applications: GIS and GPS integration

Learning Resources:

1. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015

2 Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System:

Theory and Practice, Springer: Berlin, 2011.

3. Hofmann-Wellenhof, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013.

With effect from the year 2018-19
With effect from the A.Y 2018-19

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE V-SEMESTER
PROJECT MANAGEMENT (Open Elective – V)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE540CE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	*Upon the completion of the course, students are expected to*
1. Learn the concept of project management along with functions and objectives. 2. Understand the various techniques used for project planning such as bar charts, CPM, PERT and crashing of networks. 3. Acquire knowledge on various types of contracts, tenders.	1. Understand the objectives, functions and principles of management in projects. 2. Practice the network techniques like CPM and PERT for better planning and scheduling of engineering works. 3. Analyse the importance of cost and time in network analysis and planning the work accordingly. 4. Knowledge on Contracts, Tenders, and Work orders related to the projects.

UNIT-I

Significance of Project Management: Objectives and functions of project management, management team, principles of organization and types of organisation.

UNIT-II

Project Planning: Planning, bar charts, network techniques in project management - CPM and PERT. Expected likely, pessimistic and optimistic time, normal distribution curve and network problems.

UNIT-III

Contracts: Introduction, types of contracts and their advantages and disadvantages, conditions of contracts, Introduction to Indian contract act.

UNIT-IV

Time Cost Analysis: Cost time analysis in network planning, updating

Tender: Tender form, Tender Documents, Tender Notice, Work Order.

Learning Resources:

1. Srinath L.S., PERT and CPM: Principles and Application, East-West Press, 1975.
2. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2009
3. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 1990.
4. http://nptel.ac.in/courses/

With effect from the year 2018-19

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E V SEMESTER
INTRODUCTION TO SOFTWARE ENGINEERING
(Open Elective-IV)

Instruction: 1 Hr /week	SEE Marks :50	Course Code :OE510CS
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, students will be able to
• Understand the concepts involved in the lifecycle of software development • Learn the best practices to be employed for the design and testing.	1. Explain the various software development lifecycle models for a software system development. 2. Build the prototype for software business case and analyze the requirements of software project. 3. Analyze the different behavioral and structural models for the designed object oriented system. 4. Identify verification and validation methods in a software engineering project and implement testing methods at various phases of SDLC

UNIT-I

Introduction to Software Engineering:

A generic view of Process: Software Engineering, Process Framework CMM Process Patterns, Process Assessment.

Process Models: Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process.

An Agile view of Process: What is Agility, What is an Agile Process, Agile Process Models.

Requirements Engineering: A bridge to Design and Construction, Requirements Engineering Tasks, Initiating Requirements Engineering Process, Eliciting Requirements, Negotiating Requirements, Validating Requirements.

UNIT-II

Object oriented Modeling & design using UML: Introduction to UML.

Structural Modeling: Classes and Advanced Classes, Relationships and Advanced Relationships, Common Mechanisms, Class Diagrams.

Behavioural Modelling: Interactions, Interaction diagrams, Use Cases, Use Case Diagrams, Activity diagrams, State Machines, State chart Diagrams.

Testing Tactics: Software testing fundamentals, Black box and White box testing.

Suggested Books:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 6th Edition (2005), Tata McGrawHill.
2. Grady Booch, James Rumbagu, Ivor Jacobson, The Unified Modeling Language-User guide, (Covering UML 2.0) ,2nd Edition (2007), Pearson Education, India.

Reference Books:

1. Shari Lawrence Pfleeger, Software engineering Theory and Practices, 4th Edition (2011), Pearson Education, India.
2. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition (2005), Narosa Publishing House.

Online Resources:

1. http://nptel.ac.in/courses/106101061/
2. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-355j-software-engineering concepts-fall-2005/lecture-notes/

With effect from the year 2018-19

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E V SEMESTER
INTRODUCTION TO JAVA PROGRAMMING (Open elective-V)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code :OE520CS
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to	At the end of the course, Students will be able to
• Apply object oriented principles for developing an application using Java constructs • Design GUI using existing Java classes and interfaces	1. Apply the object oriented programming (OOP) concepts to design an application. 2. Employ runtime error handling, concurrent programming practices to develop a parallel processing application 3. Read and write the IO operations using console and files streams 4. Design dynamic GUI for a java application using AWT classes

UNIT – I

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements, Classes and Methods, Garbage Collection, this keyword, final, Inheritance, Method Overriding.

UNIT – II

Abstract class, Nested class, Interface, Package, Exception Handling, Multithreaded Programming, String Handling.

UNIT - III

Util: String Tokenizer, Date, Calendar, Random, Timer, Observable
IO: Java I/O Classes and Interfaces, Files and Directories, Byte and Character Streams

UNIT – IV

GUI and event Programming: Applet Class, Applet architecture, The Delegation Event Model, Event Classes, Source of Events, Events Listener Interfaces, AWT: Classes, Working with Graphics, Frames, Menu, Layout Managers**.**

Suggested Books:

1. Herbert Schildt, *The Complete Reference Java*, 7th Edition, Tata McGraw Hill 2005.

Reference Books:

1. P. Radha Krishna, *Object Oriented Programming through Java,* Universities Press, 2007.
2. Sachin Malhotra, Saurabh Choudhary, *Programming in Java*, 2nd Edition, Oxford Press, 2014.

Online Resources:

https://docs.oracle.com/javase/tutorial/java

With effect from the year 2018-19

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

INTRODUCTION TO TELEMETRY (Open Elective -IV)

(for other Departments)

Instruction: 1 Hrs /week	SEE Marks :50	Course Code :**OE510EC**
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objective	**Course Outcomes**
1. To understand the concept of telemetry systems.	**At the end of the course, students will be able to:** 1. Analyze different components of telemetry systems. 2. Acquire knowledge on wired and wireless data acquisition techniques in telemetry systems. 3. Demonstrate the knowledge on satellite telemetry systems. 4. Apply techniques of different telemetry systems in real time applications.

UNIT - I

Introduction to Telemetry Principles: Introduction, the Basic System, Classification, Non-electrical Telemetry Systems, Voltage and Current Telemetry Systems, Local Transmitters and Converters, Frequency Telemetry, Power Line Carrier Communication (PLCC).

Wave Propagation: Space Propagation of Waves, Surface Wave, the Ionosphere, Some Considerations on Space Wave Propagation.

UNIT - II

Basics of Satellite Telemetry, Introduction, General Considerations, TT & C Services, Digital Transmission System in Satellite Telemetry, TDM, Some Aspects of TT&C – Subsystems, Satellite Telemetry and Communications: MA Techniques.

Fiber Optic Telemetry: Introduction, Optic Fiber Cable, Dispersion, Losses, Connectors and Splices, Sources and Detectors, Transmitter and Receiver Circuits, Coherent Optical Fiber Communication System, Wavelength Division Multiplexing.

Suggested Reading:

1. D. Patranabis, Telemetry Principles, Tata McGraw-Hill, 1999
2. Swoboda G., Telecontrol Methods and Applications of Telemetry and Remote Control, Reinhold Publishing Corp., London, 1991
3. Young R.E., Telemetry Engineering, Little Books Ltd., London, 1988
4. Gruenberg L., Handbook of Telemetry and Remote Control, McGraw Hill, New York, 1987.

With effect from the year 2018-19

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

INTRODUCTION TO SIGNAL PROCESSING (Open Elective -V)

(for other Departments)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code :**OE520EC**
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. To Introduce the basics of Signals and Systems, and the principles of Digital Signal Processing (DSP). To design digital filter using frequency domain concepts.	**At the end of the course, students will be able:** 1. To classify discrete time signals as energy and power and to classify discrete time systems as causal-non causal, linear-nonlinear and stable-unstable. 2. To study the properties of discrete time Fourier transform, discrete Fourier transform and z-transform. 3. To implement the DFT using FFT for the given sequence. 4. To realize digital filter structures from their z-transform. 5. To apply DSP techniques to audio, image processing and telecommunication areas.

UNIT – I

Introduction to signals: Definition, Representation, Elementary Signals: Unit Impulse, Unit Step, Unit Ramp, Rectangular and Triangular, Classification of signals: periodic and non-periodic, Energy and Power, even and odd, Basic operations on signals such as shifting, scaling and reversal.

UNIT – II

Introduction to Discrete Time Systems: Definition, Classification of systems: Linear and Non-linear, Time Invariant and Time Variant, Causal and Non-causal, Stable and Unstable, Introduction to LTI systems, Properties of an LTI system and linear convolution.

UNIT – III

Discrete Transform Techniques: Discrete Time Fourier Transform and its properties, Discrete Fourier Transform and its properties, Circular convolution, Twiddled factor and its properties, Introduction to FFT algorithms, Z-transform and its properties, transfer function.

UNIT – IV

A Frame work for digital filter design: Types of digital filters, Ideal filter characteristics, Specification of practical filters, Design of FIR filters using windowing techniques, Design of Digital IIR Low Pass Filter using butterworth approximation, realization of filter structures. Some Application Areas of DSP.

Suggested Readings:

1. Rao, K. Deergha, Swamy M.N.S., "Digital Signal Processing – Theory and Practice", 1st edition, Springer, 2018.
2. Ifeachor, E.C. and Jerris, B.W., "Digital Signal Processing: A practical Approach," 2nd edition, Pearson Education.
3. Tan, Li, "Digital Signal Processing – Fundamentals and Applications", Academic Press.
4. Mitra, S.K., "Digital Signal Processing – A Computer Based Approach", 3rd Ed., Tata McGraw-Hill.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
BASICS OF POWER SYSTEMS (Open Elective –IV)

Instruction: 1 Hrs /week	SEE Marks :50	Course Code :OE510EE
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course objective:	**Course Outcomes:**
Electrical Power plays significant role in day to day life of entire mankind. This course gives an over view of electrical power generation and economic aspects of power to all engineers of all disciplines.	**At the end of the course, students will be able to:** 1. **Identify** the various and major ways of generation of Power in India. 2. **Estimate** the Energy generated by Hydel Generating station. 3. **Calculate** the Capacitance value for P.f. improvement. 4. **Assess** the Tariffs of domestic and commercial.

UNIT – I

Thermal Power Station: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components-Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

Hydro Power Stations: Power Generation Principles, Choice of site, layout and various parts of generating stations, Estimation of power in Hydel, flow duration curve, hydrograph, mass curve etc. Types of Hydel stations.

UNIT – II

Nuclear Power Stations: Nuclear Fission and Chain reaction, Nuclear fuels, Principle of operation of Nuclear reactor, Reactor Components-Moderators, Control rods, Reflectors and Coolants, Radiation hazards-Shielding and Safety precautions.

Economics of Power Generation: Load Curve, load demand and diversity factors, base load and peak load operation, types of costs and depreciation fund calculations, Tariffs.

Power Factor: Causes of low P.F, Improving power factor ,Methods of power factor improvement, Numerical problems.

Suggested Reading

1. C.L. Wadhwa, Electrical Power Systems, Wiley Eastern Ltd. 5th Edition, 2005
2. C.L. Wadhwa, Generation, Distribution and Utilisation of Electrical Energy, Wiley Eastern Ltd., 5th Edition, 2005.
3. S.N.Singh- Electrical Power Generation, Transmission and Distribution-Prentice Hall pvt.ltd. New-2003.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
FUNDAMENTALS OF POWER ELECTRONICS (Open Elective –V)

Instruction: 2Hrs /week	SEE Marks :70	Course Code :OE520EE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	Course Outcomes:
To provide fundamentals of power semi-conductor devices and power electronics converters in power electronics.	**At the end of the course, students will be able to:** 1. Categorize and compare power electronic devices. 2. Explain the operation of AC-DC, DC-DC and DC-AC converters. 3. Explain the control strategies of Choppers and PWM techniques in inverters. 4. Analyze and select the appropriate converter for a given application.

Unit –I Power Semi – conductor Switches:
Operation and static characteristics of power diode, SCR, MOSFET and IGBT, applications.

Unit – II AC – DC Converters:
Operation of 1 – ϕ half wave rectifiers with R, R – L and R – L – E loads, operation of 1 – ϕ bride type full and semi – converters with R – L – E load, applications.

Unit – III Choppers:
Operation of step down and step up choppers, control strategies, applications.

Unit – IV DC – AC Converters:
Operation of 1 - ϕ inverters, operation of 3 - ϕ inverters – 180° and 120° mode, pulse width modulation techniques, applications.

Learning Resources:

1. Bimbra.P.S, *Power Electronics*, Third Edition, Khanna Publishers, 2012.
2. Singh, M.D and Khanchandani, K.B, – *Power Electronics*, Tata McGraw Hill, 2nd Edition, 2006.
3. Rashid, M.H – *Power Electronics: Devices, Circuits and Applications,* Pearson, 2003
4. Mohan, Undeland, Robbins, *Power Electronics – Converters, Applications and Design*, Wiley India Pvt Ltd, 2010.

DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS FOR B.E V- SEMESTER
INTRODUCTION TO LINUX (Open Elective - IV)

Instruction:1Hrs/ week	**SEE Marks** : 50	**Course Code** :OE510IT
Credits : 1	**CIE Marks**:30	**Duration of SEE** : 2 Hours

Course Objectives	**Course Outcomes**
The course will enable the students to:	**At the end of the course student will be able to:**
Acquire basic skills for using Linux operating system.	1. Install Linux operating system and use desktop environment. 2. Identify and use Linux utilities to create and manage simple file processing operations. 3. Organize directory structures with appropriate security. 4. Configure and use Linux shell.

Unit I

Introduction to Linux, Installing Linux, Running Linux from USB Drive, Understanding X Windows System and Desktop, Navigating through Linux Desktop and Managing files. Understanding Linux file system, listing files and directory attributes , Making files and directories , Listing and changing permissions and ownership.

Unit II

Understanding the Linux Shell, understanding aliases, Using the shell from console or terminals, Using command history and tab completion, Connecting and expanding commands, Creating aliases, Making shell settings permanent, Using man pages and other documentation.

Learning resources

Introduction to Linux – A Hands On Guide, Machtelt Garrels.
https://linuxjourney.com/

DEPARTMENT OF INFORMATION TECHNOLOGY

SYLLABUS FOR B.E V- SEMESTER

INTRODUCTION TO JAVA PROGRAMMING LANGUAGE (Open Elective - V)

Instruction:2Hrs/ week	**SEE Marks** : 70	**Course Code** :OE520IT
Credits : 2	**CIE Marks**:30	**Duration of SEE** : 3Hours

Course Objectives	Course Outcomes
The course will enable the students to:	**At the end of the course student will be able to:**
Acquire skills to write basic Java programs.	1. Use arrays to store multiple data elements. 2. Organize programs logically with the usage of packages. 3. Create, throw and handle exceptions. 4. Perform basic Input Output file operations.

Unit I

Java Programming Fundamentals: Introduction, Overview of Java, structure of a Java program, data types, variables-scope and lifetime, operators, control statements, classes, methods, command line arguments.

Unit II

Arrays: one-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two dimensional arrays. Inheritance, Interfaces: defining interfaces, extending interfaces, implementing interfaces.

Unit III

Packages: creation, importing a package and user defined packages.

Exception Handling: Introduction, types of exceptions, syntax of exception handling code, multiple catch statements, using finaaly statement, user-defined exceptions.

Unit IV

Basic I/O Streams: Java I/O classes and interfaces, Files, Stream and Byte classes. Character Streams, Serialization.

Exploring java.lang: Object, Wrapper classes, String, StringBuffer.

Suggested Reading:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th edition, McGraw Hill Publishing, 2010.
4. Y. Daniel Liang, An Introduction to JAVA Programming, TMHl, 2009.
5. Kathy Sierra, Head First Java, 2/e, Shroff Publishers, 2012.

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
BASICS OF 3-D PRINTING (Open Elective-IV)

Instruction : 1 Hour/week	SEE Marks : 50	Course Code : OE500ME
Credits : 1	CIE Marks :30	Duration of SEE : 2Hours

Course Objectives	Course Outcomes
The objective of the course is to • understand the fundamentals of various rapid prototyping technologies with emphasis on FDM technology for application to various industrial needs.	After completion of the course, the student will be able to 1. understand the fundamentals of Additive manufacturing Technologies for engineering applications. 2. Understand the methodology to manufacture the products using FDM technology 3. study the applications, advantages and case studies of FDM technology. 4. identify different industrial sectors for application of AMT to reduce manufacturing cost and time.

UNIT-I

Introduction, Reverse engineering and its Methodology, Historical development, Advantages of 3-D printing, 3-D printing process chain, Classification of various 3-D printing processes.

Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies, Practical demonstration

UNIT-II

Applications of 3-D printing in various fields like aerospace, jewellery, medicine, forensic science and anthropology, visualization of bio-molecules, etc.

Learning Resources:

1. C K Chua, K F Leong, C S Lim, "Rapid Prototyping – Principles and applications", 3rd Ed., World Scientific Publishing Co. Pvt. Ltd, 2010
2. Pham, D.T. and Dimov S.S., "Rapid Manufacturing", Springer, 2001
3. AmithabaGhose, "Rapid prototyping", Eastern Law house, 1997
4. Paul F. Jacobs, "Rapid Prototyping & Manufacturing" ASME Press, 1996

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
INTRODUCTION TO ROBOTICS (Open Elective-V)

Instruction:2Hours /week	SEE Marks : 70	Course Code : OE510ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.	On completion of the course, the student will be able to 1. list and explain the basic elements of industrial robots 2. analyse robot kinematics and its control methods. 3. classifythe various sensors used in robots for better performance. 4. summarize various industrial and non-industrial applications of robots.

UNIT I - ROBOT BASICS

Robot-Basic concepts, Need, Law, History, Anatomy, specifications.
Robot configurations-cartesian, cylinder, polar and articulate.
Robot wrist mechanism, Precision and accuracy of robot.

ROBOT ELEMENTS

End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system
Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation.

UNIT II - ROBOT KINEMATICS AND CONTROL

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation.
Control of robot manipulators – Point to point, Continuous Path Control, Robot programming

UNIT III - ROBOT SENSORS

Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors,
Introduction to Machine Vision and Artificial Intelligence.

UNIT IV - ROBOT APPLICATIONS

Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management.
Applications, Micro and Nanorobots, Future Applications.

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata –McGraw Hill Pub. Co., 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.
3. Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering: An Integrated Approach"', Prentice Hall of India Pvt. Ltd., 1994.
4. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, "Robotics control, sensing, vision and intelligence", Tata- McGraw Hill Pub. Co., 2008
5. , Yu. "Industrial Robotics", MIR Publishers Moscow, 1985.

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
BASICS OF ENTREPRENEURSHIP

Instruction : 2 Hours / week	SEE Marks : 70	Course Code : OE520ME
Credits : 2	CIE Marks : 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to : • understand and discover entrepreneurship • build a strong foundation for the students to start, build and grow a viable and sustainable venture • develop an entrepreneurial outlook and mind set, critical skills and knowledge	On completion of the course the student will be able to: 1. understand entrepreneurship as a career option and develop customers, channels and traction 2. understand the method of creating business model and make a minimum viable product. 3. develop costing and pricing strategies 4. understand team building and its importance 5. create marketing and sales strategies for business and understand business regulations and government schemes.

UNIT-I

Introduction to Entrepreneurship: Define Entrepreneurship, Entrepreneurship as a career option, Benefits and Myths of Entrepreneurship, Characteristics, Qualities and Skills of Entrepreneurship on Economy and Society

Opportunity and Customer Analysis: Identify your Entrepreneurial Style, Identify Business Opportunities, Methods of finding and understanding Customer Problems, Process of Design Thinking, Identify Potential Problems, Customer Segmentation and Targeting, Customer Adoption Process, Craft your Value Proportions, Customer-Driven Innovation.

UNIT-II

Business Model and Validation: Types of Business Models, Lean Approach, the Problem-Solution Test, Solution Interview Method, Difference between Start-up Venture and small Business, Industry Analysis, Identify Minimum Viable Product (MVP), Build-Measure-Lean Feedback Loop, Product-market fit test.

UNIT-III

Economics and Financial Analysis: Revenue sources of Companies, Income analysis and Cost Analysis-Product Cost and Operation Cost, Basics of Unit Costing, Profit Analysis, Customer Value Analysis, Different Pricing Strategies, Investors Expectations, Practice Pitching to Investors and Corporate.

UNIT-IV

Team Building and Project Management: Leadership Styles, Team Building in Venture, Role of good team in Venture, Roles and Respondents, Explore Collaboration Tools and Techniques-brainstorming, Mind Mapping. Importance of Project Management, Time Management, Work Flow, Network Analysis Techniques.

Marketing &Business Regulations: Positioning, Positioning Strategies, Building Digital Presence and Leveraging Social Media, Measuring effectiveness of Channels, Customer Decision-making Process, Sales plans and Targets, Unique Sales Proposition (USP), Follow-up and Close Sales. Business Regulations of starting and operating a Business, Start-up Ecosystem, Government schemes.

Learning Resources:

1. Robert D Hisrich, Michael P Peters, Dean A Shepherd, "Entrepreneurship", Sixth edition, New Delhi, 2006.
2. Thomas W. Zimmerer, Norman M. Scarborough, "Essentials of Entrepreneurship and small business Management", Fourth edition, Pearson, New Delhi,2006.
3. Alfred E. Osborne, "Entrepreneurs Toolkit", Harvard Business Essentials, HBS Press, USA,2005
4. MadhurimaLall and ShikhaSahai, "Entrepreneurship", Excel Books, First Edition, New Delhi,2006

With effect from the year 2018-19

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. V SEMESTER
ELECTRONIC ENGINEERING MATERIALS *(Open Elective-IV)*

Instruction :1 Hours / Week	SEE Marks :50	Course Code : OE400CH
Credits : 1	CIE Marks :30	Duration of SEE :2 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the students:	**At the end of the course students should be able to:**
1. To familiarize with various types of liquid crystals, their chemical constitution and behavior 2. To acquaint with different types of sensors and chemistry involved in them 3. To discuss the conductance in polymers and mechanism of conductance in undoped and doped polymers	1. Explain the classification, types and applications of liquid crystals 1. Discuss the principles, mechanism and applications of potentiometric and amperometric sensors 2. Explain the principle, mechanism and applications of fluorophore based, chromophore based and enzyme based fibre optic biosensors 3. Discuss the mechanism of conduction in undoped and doped polymers and applications of conducting polymers

UNIT-I: Liquid Crystals

Introduction, Classification: Thermotropic and Lyotropic liquid crystals. Chemical constitution & liquid crystalline behavior. Molecular ordering in liquid crystals: Nematic, Smectic and Cholesteric. Applications.

UNIT-II: Conducting Polymers and Sensors

a) Conducting Polymers: Introduction, Classification: Extrinsic and Intrinsic Conducting Polymers**.** Mechanism of conduction of doped and undoped polyacetylene& Polyaniline. Applications.

b) Sensors: Introduction, Potentiometric sensors, Amperometric sensors, Fluoride-ion-selective electrode. Fluorophore and Chromophore based Fiber-optic Biosensors. Enzyme Based Non-mediated Fiber Optic Biosensors.

Suggested Reading:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).

3. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning
4. A textbook of Polymer Science: Fred, Billmeyer Jr., Wiley India Third edition.
5. Chemistry of Advanced Materials: CNR Rao, RSC Publication
6. Billmeyar F. W., "Text book of Polymer Science", Wiley-Inter Science, New York, 2002.
7. Arora M. G., Singh M and Yadav M.S, "Polymer Chemistry", Anmol Publications, New Delhi, 2003.

Online resources:

1. www.nptel.ac.in
2. http://ndl.iitkgp.ac.in
3. http://ocw.mit.edu

With effect from the year 2018-19

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. V SEMESTER
POLYMER TECHNOLOGY *(Open Elective-IV)*

Instruction :1 Hours / Week	SEE Marks :50	Course Code : OE410CH
Credits : 1	CIE Marks :30	Duration of SEE :2 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the students:	**At the end of the course students should be able to:**
1. To familiarize with various types of polymers and polymerization methods and effect of their structure on properties. 2. To acquaint with different types of moulding techniques. 3. To discuss the reinforced plastics and biomedical applications of polymers	1. Explain the classification and types of polymerization methods 2. Discuss the moulding constituents and moulding techniques. 3. Discuss the different polymer blends and engineering plastics. 4. Choose the polymers for different applications.

UNIT-I: Introduction, classification of polymers, methods of polymerization-Condensation polymerization (High temperature and low temperature methods), addition polymerization-bulk polymerization, solution polymerization, emulsion polymerization and suspension polymerization. Effect of polymer structure on properties.

UNIT-II: Moulding constituents of plastic, moulding techniques-Compression moulding, injection moulding, and extrusion moulding. Reinforced plastics, polymer blends and alloys, engineering plastics-polyamides, polycarbonates, polyurethanes. Polymers in medicine, biomedical applications of polymers.

Suggested Reading:

2. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002)
3. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).
4. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).
5. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning

With effect from the year 2018-19

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. V SEMESTER
INDUSTRIAL POLLUTION PREVENTION AND CONTROL
(Open Elective-IV)

Instruction :1 Hours / Week	SEE Marks :50	Course Code : OE420CH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the students :	At the end of the course students should be able to:
1. An overview of pollution in industries 2. Principles of various processes the treatment of air and water pollution	1. Explain the causes of pollution. 2. Describe the various sources of pollution. 3. Understand the effects of uncontrolled emissions. 4. Apply various methods to dispose the waste and minimize the pollution.

UNIT-I : Introduction, types of industrial waste, definition of pollutant, air pollutants- gases, hydro carbon pollutants, particulates - inorganic and organic particulates- effects of particulate pollutants, chlorofloro carbons(CFC)- cause of ozone depletion- harmful effects of cfc,photo chemical smog, air pollutant control methods: particulate emission control-gravitational setting chambers-cyclone separators, fabric filters, electrostatic precipitators.

UNIT-II: Water pollution: Definition of water pollution, types of water pollutants- Inorganic pollutants, toxic metals, organic pollutants, determental effects of Inorganic pollutants, toxic metals and organic pollutants, water pollution control methods-primary and secondary treatment.

Treatment and disposal of industrial wastes, treatment of wastes or effluents with organic impurities, treatment of wastes or effluents with inorganic impurities, the nature, effect and treatment of some important chemical wastes. Case study.

Suggested Reading:

1. B K Sharma, "Industrial Chemistry", GOEL publishing house, Meerut.
2. Pandey.G.N and Carney.G.C, "*Environmental Engineering"*, Tata McGrawHill, New Delhi,1989
3. Rose.G.R.D, "*Air pollution and Industry"*, Van Nostrand Reinhold Co., NewYork 1972
4. Freeman HM, "Industrial pollution prevention hand book", McGraw Hill.
5. James G Mann and Liu Y A, "Industrial water reuse and waste water minimization, McGraw Hill.

With effect from the year 2018-19

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. V SEMESTER
ELECTROCHEMICAL ENERGY SYSTEMS*(Open Elective-IV)*

Instruction :2 Hours / Week	SEE Marks :70	Course Code : OE430CH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the students :	**At the end of the course students should be able to:**
• To introduce the various terms to understand the efficiency of batteries. • To know the relevant materials required for the construction of primary and secondary batteries. • To familiarize with the reactions involved during charging and discharging processes. • To focus on the need of fuel cells and the concept of their construction and functioning • To emphasize on the merits and demerits of each type of battery.	1. Discuss the construction, electrochemistry, technology and applications of selected primary batteries 2. Discuss the construction, electrochemistry, technology and applications of few secondary batteries 3. Explain the working principle, electrochemistry, technology and applications of prominent fuel cells 4. Choose a suitable battery or a fuel cell for a given application 5. Evaluate different batteries or fuel cells in order to select a suitable battery or fuel cell for a given application

Unit-I: Batteries- Fundamentals

Types of cells: Reversible and Irreversible cells, Primary, Secondary and Reserve batteries.

Battery characteristics: Free energy change, Electromotive force of battery, Ampere-Hour, Capacity, Power, Power density, Energy density, Efficiency, Cycle life, Tolerance to service conditions, Performance characteristics.

Unit-II: Primary Batteries

Construction, electrochemistry and technology of Zinc-Air Battery, Nickel metal hydride battery,

Primary lithium batteries: **Soluble Cathode Cells**, **Solid Cathode Cells**- Lithium Manganese dioxide, Lithium-Vanadium Pentoxide battery, **Solid electrolyte cells**- Lithium polymer electrolyte Battery-Applications.

Unit-III: Secondary Batteries

Construction, electrochemistry and technology of Maintenance Free Lead Acid battery (MFLA), Valve Regulated Lead Acid battery (VRLA), Absorbed Glass Mat Lead Acid battery (AGMLA). Nickel-Cadmium battery, Reserve battery.

Secondary Lithium batteries: Liquid organic electrolyte cells, polymer electrolyte cells, lithium ion cells, applications.

Unit –IV: Fuel Cells

Introduction, classification based on temperature and nature of electrolyte. Working principle, components, applications and environmental aspects of Alkaline fuel cell (AFC)- Hydrogen-Oxygen alkaline fuel cell, Methyl alcohol - Oxygen alkaline fuel cell, Phosphoric acid fuel cell (PAFC), Molten carbonate fuel cell (MCFC), Polymer Electrolyte membrane Fuel cell (PEMFC), Solid oxide fuel cell (SOFC).

Suggested Reading

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).
3. Dell R. M. and Rand D. A. J., "Understanding Batteries", Royal Society of Chemistry, UK, 2001.
4. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning
2. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).
3. Dell R. M. and Rand D. A. J., "Understanding Batteries", Royal Society of Chemistry, UK, 2001.
4. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993

With effect from the year 2018-19

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. V SEMESTER
CORROSION SCIENCE AND TECHNOLOGY *(Open Elective-IV)*

Instruction :2 Hours / Week	SEE Marks :70	Course Code : OE440CH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the students :	**At the end of the course students should be able to:**
1. To acquaint with the causes and factors influencing the rate of corrosion 2. To understand the different types of corrosion like dry, wet and galvanic corrosion and their relative impact 3. To familiarize with various preventive methods of corrosion such as cathodic protection, use of inhibitors, coatings, etc. 4. To know various industrial methods like electroplating, electroless plating.	1. Explain different types of corrosion with suitable examples 2. Analyze the given case study and diagnose the type of corrosion in a given corrosion problem 3. Discuss different factors that affect corrosion and passivation of metals 4. Select a suitable metallic coating for corrosion control of the equipment in a given application 5. Explain the mechanism by which organic coatings and inhibitors control corrosion of metals 6. Discuss the principles and application of cathodic protection and surface conversion coatings for corrosion control

UNIT-I: Chemical and Electrochemical Corrosion

Introduction - gravity, **cause, C**hemical and Electrochemical corrosion, **Pilling – Bed worth** rule, effect of nature of oxide layer on rate of chemical corrosion, **Galvanic corrosion**, electrochemical series and galvanic series. **F**ormation of anodic and cathodic areas, Differential aeration corrosion -pitting, water line **corrosion** & crevice corrosion, stress corrosion, corrosion fatigue. Passivation of metals, polarization curve of passivating metals, effect of pH and potential-pH diagram for iron (Pourbaix Diagram) and polarization curve of iron, application of Pourbaix diagram for corrosion mitigation.

Factors influencing corrosion

a. Nature of metal: Relative position of metal in galvanic series, Over voltage, Relative areas of anode & cathode and Nature of corrosion product.

b. Nature of environment: Temperature, pH and Humidity.

UNIT-II: Corrosion Control by Metallic Coatings

Metallic coatings: Types - anodic & cathodic. Pre treatment**of** surface of base metal. Methods of application of metallic coatings: Hot dipping-galvanization - applications of galvanized RCC steel bars. Cladding, Electro plating & Electroless plating- Principle and their differences.
Electroplating of Cu coating on Fe, Electroless plating of Ni coating on Insulators, Preparation of PCB using Electroless plating.

UNIT-III: Corrosion Control by Inhibitors and Organic Coatings

Corrosion Inhibitors: Anodic, Cathodic and Vapour phase inhibitors.
Organic Coatings: Paints – constituents and their functions. Vitreous enamel coatings. Varnishes. Super hydrophobic and self healing coatings. Epoxy coatings on RCC steel bars- Impervious coatings.

UNIT-IV: Corrosion Control by Cathodic Protection and Surface Conversion

Cathodic protection: Principle, Sacrificial Anodic Protection (SAP), Impressed Current Cathodic Protection (ICCP). Application of Cathodic protection for bridges, ship hulls and underground pipelines.
Surface conversion coatings: Carburizing, Nitriding, Cyaniding.

Suggested Reading:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).
3. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning
4. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).
5. Principles and prevention of corrosion: Denny A Jones, Prentice Hall, 1996.
6. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993
7. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering
8. Corrosion Engineering: Mars G Fontana, Mc Graw Hill, 1987

Online resources:

1. www.nptel.ac.in
2. http://ndl.iitkgp.ac.in
3. http://ocw.mit.edu

With effect from the year 2018-19

DEPARTMENT OF PHYSICS
SYLLABUS FOR B.E. V SEMESTER
DISPLAY DEVICES (Open Elective-IV)

Instruction :1 Hours / week	SEE Marks :50	Course Code : OE400PH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

Course objectives	Course outcomes
Students will be able to learn • Basics of luminescence and display devices	**At the end of the course students will be able to** 1. List out different types of luminescence mechanisms 2. Classify types of display devices 3. Explain working of some display devices 4. Compare the output intensities emitted by LED, OLED et

UNIT-I:
Introduction to Luminescence, fluorescence, phosphorescence, principle and classification, luminescence mechanisms for various types and its applications.

UNIT-II:
Classification of display devices, working of Liquid crystal displays, comparison of LED and LCD, dynamic scattering display, OLEDS and their applications.

SUGGESTED BOOKS:
1. S. W. S. McKeever, Thermoluminescence of Solids, Cambridge University Press, 1988
2. Adrian Kita, Luminescent Materials and Applications, John Willey & Sons

DEPARTMENT OF PHYSICS
SYLLABUS FOR B.E. V SEMESTER
FUNDAMENTALS OF VACCUM TECHNOLOGY (Open Elective-IV)

Instruction :1 Hours / week	SEE Marks :50	Course Code : OE410PH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

Course objectives	Course outcomes
Students will be able to learn • Fundamentals of vacuum technology	**At the end of the course students will be able to** 1. Define basic vacuum technology related notations. 2. Enumerate methods production of vacuum. 3. List out different vacuum gauges and their limitations. 4. Identify types of vacuum leaks.

UNIT-I:

Definition of vacuum, units of vacuum, vacuum ranges, evaporation theory- rate of evaporation, Hertz- Knudsen equation, types of evaporation, adsorption, desorption, Production of Vacuum, vacuum measurement, Vacuum pumps: pumping speed, throughput, Rotary oil pump, multi stage rotary pumps, diffusion pump, cryo-pump. Vacuum applications in various areas of engineering.

UNIT-II:

Measurement of vacuum, Vacuum gauges: thermocouple gauge, Pirani gauge, ionization gauge, Penning gauge, leak detection, Leak detection methods

SUGGESTED BOOKS:

1. M. N. Avadhanulu and P.G. Kshirsagar, Textbook of Engineering Physics, Revised Edition, S.Chand, 2015
2. Dr. V.V. Rao, Dr. T.B. Gosh, Dr. K.L. Chopra, Vacuum Science and Technology, Allied Publishers, New Delhi, 2008
3. John F. O'HanlonA User's Guide to Vacuum Technology, Jhon Willey and sons, 2006

With effect from the year 2018-19

DEPARTMENT OF PHYSICS

SYLLABUS FOR B.E. V SEMESTER

INTRODUCTION TO NON- DESTRUCTIVE TESTING

(Open Elective-IV)

Instruction :1 Hours / week	SEE Marks :50	Course Code : OE420PH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

Course objectives	Course outcomes
Students will be able to learn • Basics of acoustics and non-destructive testing	**At the end of the course students will be able to** 1. Illustrate non-destructive testing 2. Explain production mechanisms of ultrasonics 3. Differentiate various methods of non-destructive testing 4. Compare the non-destructive testing methods and identify suitable one for given application.

UNIT-I:

Ultrasonic waves and their properties, Production of ultrasonics by Piezo-electric and magnetostriction methods, Detection of ultrasonics, Acoustic grating: ultrasonic velocity measurement, cavitation, Applications: ultrasonic cleaning, Echo cardiogram (ECG), ultrasonic imaging.

UNIT-II:

Introduction to non- destructive testing (NDT)- objectives of NDT-advantages- types of defects-methods of NDT: Visual inspection, liquid penetration testing, acoustic detection: pulse echo method, ultrasonic inspection methods, Radiography: x-ray and gamma ray, Electromagnetic: eddy current testing, Acoustic Emission, Ultrasonic Testing (UT)

SUGGESTED BOOKS:

1. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage learning, 2014
2. M. N. Avadhanulu and P.G. KshirSagar, Textbook of Engineering Physics: Revised Edition, S.Chand, 2015
3. R K Gaur and S L Gupta, Engineering Physics, Dhanpat Rai, 2012

With effect from the year 2018-19

DEPARTMENT OF PHYSICS
SYLLABUS FOR B.E. V SEMESTER
FUNDAMENTALS OF CRYOGENICS (Open Elective-IV)

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE430PH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

Course objectives	Course outcomes
Students will be able to learn • Liquefaction of gases • Fundamentals of cryogenics	**At the end of the course students will be able to** 1. Define ranges of liquid temperatures 2. Narrate regenerative and cascade cooling processes. 3. Enumerate properties and use of cryogenic fluids. 4. Explore applications and use of cryostats and cryocoolers.

UNIT-I:
Introduction to low temperature Physics- Porous plug experiment: Joule Thomson effect, Theory of porous plug experiment- J-K effect for a Van der Waal's gas. Relation between inversion temperature, Boyle temperature and critical temperature.

UNIT-II:
Gas-Liquefaction-Regenerative cooling and cascade process- Liquefaction of air: Linde Process, Liquefaction of hydrogen, nitrogen, helium and oxygen.

UNIT-III:
Properties of cryogenic helium and Properties of Materials at Cryogenic Temperatures.

UNIT-IV:
Adiabatic demagnetization, practical applications of low temperatures, super fluidity Liquid He-II and He-III cryostat- Cryocoolers, Cryogenic Insulations-applications.

SUGGESTED BOOKS:
1. D.S. Mathur, Heat and thermodynamics, S. Chand & Co, 2008
2. Mamata Mukhopadhyay, Fundamentals of Cryogenic Engineering, PHI, 2010

With effect from the year 2018-19

DEPARTMENT OF PHYSICS
SYLLABUS FOR B.E. V SEMESTER
SMART MATERIALS AND APPLICATIONS (Open Elective-IV)

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE440PH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

Course objectives	Course outcomes
Students will be able to learn • Essentials of smart materials • Different types of smart materials	**At the end of the course students will be able to** 1. List out various properties of functional materials 2. Identify smart materials based on properties and their appropriate usage. 3. Write different types of smart materials 4. Categorize suitable alloys for specific application.

UNIT I:

Introduction to functional materials, ferroelectricity, piezo electricity, pyroelectricity, Magnetostriction. Properties of smart materials such as piezo electric, magneto-strictive, electro-strictive, thermos-responsive

UNIT-II:

Electrochromic materials, photochromic materials, thermo-chromic materials, thermoelectric materials, smart gels, electro-rheological (ER) and Magnetorheological MR fluids

UNIT III:

Introduction to metal alloys, classification of metal alloys as ferrous and non-ferrous alloys. Properties and applications of ferrous and non-ferrous alloys.

Introduction to shape memory alloys (SMA)- advantages and disadvantages of SMAs- Austenite, martensite, shape memory effect and types of shape memory effects- temperature transformation

UNIT IV:

Properties and characteristics of engineering SMAs - Ni-Ti shape memory alloy, Cu-based shape memory alloys: Cu-Zn-Al, Cu-Al-Ni, ferromagnetic shape memory alloys Applications of SMAs.

SUGGESTED BOOKS:

1. K. Otsuka and C. M. Wayman, Shape memory Alloys, Cambridge University Press, 1999
2. Dimitris C. Lagoudas Shape Memory Alloys: Modeling and Engineering Applications, Springer, 2013
3. Vijay K. Varadan, K. J. Vinoy, S. Gopalakrishnan, Smart Material Systems and MEMS, John Wiley & Sons, 2006

With effect from the year 2018-19

DEPARTMENT OF PHYSICS

SYLLABUS FOR B.E. V SEMESTER

FUNDAMENTALS OF THIN FILM TECHNOLOGY *(*Open Elective-IV)

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE450PH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

Course objectives	Course outcomes
Students will be able to learn • Fundamentals of thin film technology • Properties and preparation mechanisms	**At the end of the course students will be able to** 1. Differentiate bulk materials and thin films 2. Explore growth process of thin films. 3. List out various thin film preparation techniques. 4. Narrate properties of thin films

UNIT-I:

Classification of films- nucleation and growth- nucleation theories: capillarity and atomistic models, substrate effect, film thickness effect.

UNIT-II:

Thin film deposition techniques- simple thermal evaporation-electron beam evaporation-sputtering (d.c and a.c), flash evaporation, Laser ablation- spin coating- molecular beam epitaxy- Film thickness measurement-ellipsometry, Fizeu (Tolonsky) technique, quartz crystal oscillator techniques.

UNIT-III:

Electrical conduction in metallic films- Continuous and discontinuous films, electrical, optical and dielectric properties of thin films

UNIT-IV:

fabrication of thin film resistor, capacitor, diode, anti-reflection coatings, gas sensors and temperature sensors.

SUGGESTED BOOKS:

1. Kasturi Chopra Thin Film Device Applications, Mac Graw Hill, New York, 2012
2. A. Goswami, thin film fundamentals, New age international, 2006
3. K.L. Chopra, thin film phenomenon, Mac Graw Hill, New York, 1990

With effect from the year 2018-19

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
SYLLABUS FOR B.E. V SEMESTER
TECHNICAL WRITING AND PROFESSIONAL PRESENTATIONS
(Open Elective-IV)

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE510EH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the student:	**At the end of the course students should be able to:**
• This course introduces the principles and mechanics of technical writing for students of engineering. • specific communications skills associated with reporting technical information and will write a series of papers ranging from process description and feasibility reports to research projects, project proposals, and statement of purpose, which are pre-requisites for start-up companies and getting into foreign universities as well. • how to make effective presentations as part of today's workplace demands.	1. write effective reports 2. research and write project proposals and SOPs 3. make persuasive presentations

UNIT I

A. **TECHNICAL REPORTS- INFORMAL**

Informal report formats, project and research reports

B. TECHNICAL REPORTS-FORMAL

Formal report components, feasibility reports, evaluation reports, Analytical and informational reports, executive summaries.

UNIT II

TECHNICAL WRITING IN BUSINESS CORRESPONDENCE

Components of a letter, forms of electronic communication, effective emails, instant and text messaging guidelines.

UNIT III

TECHNICAL RESUMES

Parts of a resume, letters of employment, resume format and distribution, cover letter writing, the curriculum vitae.

UNIT IV

a**) PROFESSIONAL PRESENTATIONS**

Personal presentations, Paper presentations, Poster presentations, Power point presentations

b) **HOW TO WRITE PROPOSALS AND STATEMENT OF PURPOSE**

Types of proposals, persuasive elements, requests for proposals, stating your objective

Learning Resources:

1. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw-Hill Education, 2005
2.Raman, Meenakshi & Sangeeta Sharma. Technical Communication: Principles and Practice. Second Edition. New Delhi: Oxford University. Press, 2011.
3. Hacking Your Statement of Purpose: A Concise Guide to Writing Your SOP,Milena Young, 2014.
4. How to prepare a *feasibility study*: a step-by-step guide including 3 model *studies*. Front Cover. Robert E. Stevens, Philip K. Sherwood. Prentice-Hall, 1982.
5. Successful Presentations (with DVD): John Hughes & Andrew Mallett. Oxford university Press.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION FOR BE VI-SEMESTER w.e.f. 2018-19 under CBCS
(Students admitted in 2016-17)

S. No	Course Code	Course	Scheme of Instruction				Scheme of Examination			Credits
			Hrs / week				Duration in Hrs.	Maximum Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	PC610ME	Machine Tools and Metal Cutting	3	0	0	0	3	70	30	3
2	PC620ME	Dynamics of Machines	3	1	0	0	3	70	30	3
3	PC630ME	Heat Transfer	3	1	0	0	3	70	30	3
4	PC640ME	Geometric Modeling	3	0	0	0	3	70	30	3
5	PC650ME	Metrology and Instrumentation	3	0	0	0	3	70	30	3
6	PE6x0ME	Professional Elective-I	3	0	0	0	3	70	30	3
7	HS610EH	Finishing School - IV: Soft Skills	1	1	0	0	1.5	35	15	1
8	MC610ME	Finishing School - IV: Technical Skills	1	0	0	0	3	35	15	1
9	OE6XXXX	Open Elective – VI	1	0	0	0	2	50	30	1
10	O6EXXXX	Open Elective – VII	2	0	0	0	3	70	30	2
PRACTICALS										
11	PC611ME	Machine Tools Lab	0	0	0	2	3	50	25	1
12	PC621ME	Dynamics and Metrology Lab	0	0	0	2	3	50	25	1
13	PC631ME	CAD Lab	0	0	0	2	3	50	25	1
		Total	**23**	**3**	**0**	**6**		**760**	**345**	**26**
		Grand Total	**32**					**1105**		

List of Professional Electives Stream wise								
	Design engineering		***Manufacturing engineering***		***Thermal engineering***		***Industrial engineering***	
	Course Code	Title	Course Code	Title	Course Code	Title	Course Code	Title
PE 1	PE600ME	Vibration analysis and Noise control	PE610ME	Manufacture and Inspection of Gears	PE620ME	Computational Fluid Dynamics	PE630ME	Production and Operations Management

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

MACHINE TOOLS & METAL CUTTING

Instruction: 3Hrs /week	SEE Marks : 70	Course Code : PC610ME
Credits : 3	CIE Marks: : 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: Study the kinematic structure and constructional features of machine tools, surface finishing, tool design characteristics, metal cutting characteristics and tool characteristics	On completion of the course, the student will be able to 1. Classify different types of machine tools used in Industry and their constructional features. 2. Manufacture of gears and screws for Industrial applications using various finishing operations. 3. Understand the importance of work holding devices and non conventional machining methods for various machining applications. 4. Compute forces in machining operations based on tool material and tool geometry. 5. Interpret functioning of coolants in metal cutting and its thermal effect on tool wears and tool life.

UNIT-I

Machine tools: Constructional features and specifications of machine tools, Kinematic structure of lathe, types of lathes, capstan and turret lathes, various operations with applications, tool and work holding devices.

Drilling: Kinematic structure of drilling, Operations, Tool and work holding devices.

UNIT-II

Shaping and Planning: Kinematic structure of Shaping and Planning, Operations, Tool and work holding devices.

Milling Machine: Kinematic structure of Milling, Operations, Indexing Methods, Tool and work holding devices

UNIT-III

Surface finishing: Units of surface finish, types of grinding, Abrasives and bonds used for grinding wheels, specifications and selection of grinding wheels. Broaching, Lapping, Honing, Super finishing and Burnishing.

Jigs and fixtures: Design principles for location and clamping. Quick clamping devices, Types of Jigs and Fixtures.

UNIT – IV

Non-traditional machining: Principles of working and applications of USM, AJM, EDM, ECM, LBM, and EBM (MRR and process parameters in each case).

Cutting tool materials: High carbon steel, HSS, Stellites, Carbides, Coated carbides, Diamonds. Tools material properties.

Chip formation: Types of chips, BUE, chip breakers.

Machining: Orthogonal and Oblique cutting, Mechanics of metal cutting, Merchant analysis, Shear angle, Solutions of Merchant and Lee & Shafer.

UNIT-V

Tool geometry: Nomenclature of single point cutting tool by ASA and ORS systems. Geometry of drills, milling cutters.

Thermal aspects of metal cutting: Sources of heat generation and heat distribution, various methods of temperature measurement, Cutting fluids and applications.

Tool wear, tool life and machinability: Types of wear, mechanism of tool wear, Tool life and Machinability, Machinability index, Taylor's tool life equation.

Learning esources:

1. B.L.Juneja and Shekon, *"Fundamentals of Metal Cutting &Machines Tools",*Wiley Eastern Ltd., 1987.
2. P.N.Rao, *"Manufacturing Technology– Metal Cutting &Machine Tools",* Vol.2, Tata McGraw Hill Education Pvt.Ltd, 2010.
3. Amitab Ghosh and Mallick,*"ManufacturingScience",* Affiliated East West Press, 1985.
4. H.S. Shan and P.C. Pandey, *"Modern Machining Process",* Tata McGraw-Hill Education, 1980.
5. A.Bhattacharya, "*Metal Cutting Theory and Practice*", New Central Book Agency (P) Ltd., Calcutta, 1996

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

DYNAMICS OF MACHINES

Instruction:3+1 Hrs /week	SEE Marks : 70	Course Code : PC620ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: understand the operational characteristics in mechanisms, gyroscopes, governors, fly wheels, clutches and brakes and formulate the governing equations for vibrations of single degree freedom	On completion of the course, the student will be able to 1. estimate the forces arise in planar mechanisms using laws of equilibrium, calculate the gyroscopic couple and interpret its effect in designing engineering systems. 2. formulate equations of motion of rigid bodies using Newton-Euler approach. 3. balancing of reciprocating and rotating machinery by addition or removal of masses by reducing inertia forces. 4. calculate frictional torque and power by applying load in clutches and brakes etc. 5. estimate the operational characteristics in Governors and design of Flywheels.

UNIT-I

Static and Dynamic: Force analysis of 4-bar and slider crank mechanisms. Study of dynamically equivalent system, Inertia forces on connecting rod.

Gyroscope: Gyroscopic couple, gyroscopic effects in vehicles. Basic concepts of Rigid body dynamics.

UNIT-II

Balancing: Forces due to rotating shaft carrying several masses in several planes. Rotary balancing on single plane and multiple planes, Shaking forces in single cylinder engine, Partial balancing of reciprocating masses. Balancing of multi cylinder in-line engines, V type engines and Radial engines.

UNIT-III

Friction: Screw threads, pivots, collars, clutches

Brakes and Dynamometers: Block, band, block and band, internally expanding shoe brakes. Prony brake, rope brake, belt transmission, epicyclic gear transmission, torsion dynamometers.

UNIT-IV

Governors: Classification of governors, Watt, Porter, Hartnell and Hartung governors, Controlling Force, Stability, Isochronism, Sensitivity, Power and Effort of governors.

Flywheels: Functions, Differences between flywheel and governor. Turning moment diagrams, flywheel analysis for I.C. Engines and Presses.

UNIT-V:

Introduction to Mechanical Vibrations: Basic concepts of simple Harmonic motion, Free Vibrations, Forced Vibrations and Damped Vibrations of single degree of freedom systems

Learning Resources:

1. R.L.Norton, "Kinematics and Dynamics of Machinery "Tata McGraw Education Pvt. Ltd., New Delhi 2009.
2. Thomas Bevan,"The Theory of Machines",CBSPublishers&Distributors,2004.
3. S.S.Rattan, "Theory of Machines", TataMcGraw Education Pvt. Ltd., New Delhi2010.
4. John J. Uicker, Jr., Gordon R. Pennock, Joseph E. Shigley, "Theory of Machines and Mechanisms", Oxford University Press,2003.

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

HEAT TRANSFER

Instruction : 3+1 Hours /week	SEE Marks: 70	Course Code : PC630ME
Credits : 3	CIE Marks: 30	Duration of SEE: 3 Hours

Course Objectives:	**Course Outcomes**:
The objective of this course is to : develop methodologies for solving a variety of practical engineering problems in conduction, convection and radiation heat transfer and their applications.	On completion of the course,the student will be able to 1. formulate heat conduction problems in rectangular, cylindrical and spherical coordinate system by transforming the physical system into a mathematical model. 2. predict time dependent heat transfer in solids for engineering applications. 3. interpret convective heat transfer coefficients in free and forced convection for internal flows & external flows. 4. estimate radiation heat transfer between black and non-black bodies using laws of radiation. 5. design of heat exchangers using the LMTD and ε-NTU approaches for industrial applications and distinguish the mechanisms involved in boiling and condensation.

UNIT – I

INTRODUCTION: Heat Transfer – Different Modes, governing laws and application to heat transfer: Fourier, Newton, Stefan– Boltzmann. General heat conduction equation: derivation in Cartesian, cylindrical and spherical coordinate systems. Steady state one dimensional heat conduction problems (i) with and without internal heat generation and (ii) with and without variable thermal conductivity: through slabs, hollow cylinders and spheres. Steady state one dimensional heat transfer through composite slabs, cylinders and spheres, overall heat transfer coefficient. Concept of thermal resistance in series and parallel. Critical radius of insulation: concept, derivation and numerical problems Thermal contact resistance, introduction to 1-dimensional Finite Difference Method.

UNIT – II

Extended surfaces or Fins: classification and applications, Heat transfer analysis of fin tips with heat dissipation environment - straight rectangular and circular fins, temperature distribution and heat transfer calculations, fin efficiency and effectiveness. Application of fin theory in temperature measurement.

Transient (Unsteady state) heat conduction: definition, negligible internal thermal resistance, negligible surface resistance, comparable internal thermal and surface resistance – lumped body, infinite body and semi-infinite body.

Use of Grober and Heisler charts: solutions to various one dimensional problems using charts (Infinite slabs, cylinders and spheres).

UNIT – III

Convection: Dimensional analysis-Buckingham theorem: application of dimensional analysis to forced and free convection problems, Physical significance of different dimensionless numbers.

Boundary layer theory concept: velocity and thermal boundary layers. Reynold's analogy for flow over plane surfaces. Free and forced convection : Calculation of heat transfer for laminar flows and turbulent flows over plates, cylinders and spheres. Internal flows through tubes using empirical correlations.

UNIT –IV

Boiling and condensation: Boiling–pool boiling regimes, nucleate pool boiling, effect of surface wettability on bubble contact angle, Critical heat flux, boiling in forced convection.

Condensation-Film condensation, Drop wise condensation, condensation film thickness, heat transfer coefficient in film condensation.

Heat Exchangers: Definition, Classification and applications of heat exchangers in industry. Overall heat transfer coefficient. Fouling factors.

Analysis and design of heat exchanger: LMTD method, effectiveness-NTU method. Analytical methods.

Chart solution procedures for solving heat exchanger problems – correction factor charts and effectiveness-NTU charts.

UNIT – V

Thermal Radiation (Non participating media): fundamental principles – Gray, White, Opaque, Transparent and Black bodies, Spectral emissive power, Wien's and Plank's laws, Hemispherical emissive power, Stefan-Boltzmann law for total emissive power of a black body, emissivity and Kirchhoff's laws. Radiation shape factor, shape factor algebra. Total emissive power radiant heat exchange between two gray surfaces. Thermal circuit for radiant heat exchange between infinite parallel plates and between concentric cylinders, enclosures with black and gray surfaces. Radiation shields and re-radiation surfaces.

Note: Use of Data book permitted**.**

Learning Resources:

1. J.P. Holman, "Heat transfer", Tata McGraw Hill Publication, New Delhi, 2010.
2. Sachadeva R.C., "Fundamentals of Engineering Heat and Mass Transfer", New Age International (P) Ltd Publishers, New Delhi, 2010.
3. Rajput R.K., "Heat and Mass Transfer", S. Chand & Company Ltd., New Delhi, 2004.
4. M.NecatiOzisik, "Heat transfer – A basic approach", McGraw-Hill, New York, 2005.
5. Incropera, F.P. and De Witt D.P.- "Fundamentals of Heat and Mass Transfer", John Wiley and sons, New York, 2008.

Data Book:

1. C. P. Kothandaraman, S. Subramanyan "Heat and Mass Transfer Data Book" New Academic Science, 2012, ISBN: 1781830045, 9781781830048

Web Resources:

1. http://nptel.ac.in/courses/112101097/
2. http://freevideolectures.com/Course/2366/Heat-and-Mass-Transfer
3. http://textofvideo.nptel.iitm.ac.in/112101097/
4. http://www.nptelvideos.in/2012/11/heat-transfer.html
5. http://web.mit.edu/lienhard/www/ahtt.html

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI SEMESTER

GEOMETRIC MODELING

Instruction : 3 Hours /week	SEE Marks : 70	Course Code : PC640ME
Credits : 3	CIE Marks: : 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to : to develop wire-frame modelling & transformations, surface, solid modelling and assembly modelling techniques.	On completion of the course, the student will be able to 1. Define geometric modeling techniques and development of wire frame modeling for synthetic entities by using mathematical equations. 2. Development of surfaces for surface modeling , 2D transformations for geometric model by matrix approach. 3. Outline the concepts of NC machines and their programming using G codes and M codes. 4. Compare the different configurations of the robot through its anatomy and application; Inspect CNC, DNC & adaptive control machining for advanced manufacturing for Engineering applications. 5. Appreciate the concept of GT, CAPP, FMS, & CIM and their applications for Industrial automation.

UNIT – I

Introduction to CAD: Conventional and modern product life cycle, conventional design and computer aided design.

Wire frame modelling: wire frame entities and their definitions. Interpolation and approximation of curves. Concept of parametric and non–parametric representation of circle and helix curves,

Synthetic Curves: Parametric representation of cubic spline, Bezier and B– spline curves, continuity, properties and characteristics of splines. Concepts of NURBS.

UNIT – II

2D Transformation and their mathematics: Translation, scaling, rotation, shearing and reflection about arbitrary points. Homogeneous co-

ordinates, Concatenated transformations. Introduction to 3D transformations and their mathematics.

UNIT – III

Surface modelling: Analytical surfaces: Definitions of planar, surface of revolution, Tabulated cylinder. Synthetic surfaces: Cubic and Bezier surfaces.

UNIT –IV

Solid modelling: C– rep and B– rep and feature instancing, Octree encoding, spatial enumeration, cell decomposition, sweeping approaches. Euler's representation of solid models.

UNIT – V

Assembly modeling: Assembly constraints, assembly tree, top down assembly, bottom up assembly, development of a history tree for a simple assembly.

Learning Resources:

1. Ibrahim Zeid, "CAD/CAM- Theory and Practice", McGraw-Hill Inc. New York, 2011.
2. Steven Harrington, "Computer graphics: a programming approach", .McGraw-Hill, 1987
3. David Rogers, J.Alan Adams, "Mathematical elements for computer graphics", McGraw Hill, 1990
4. McConnell, J. J. , "*Computer graphics theory into practice" ,* Jones and Bartlett Publishers, 2006

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

METROLOGY AND INSTRUMENTATION

Instruction : 3 Hours /week	SEE Marks : 70	Course Code : PC650ME
Credits : 3	CIE Marks: : 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are : measurement of various mechanical features using metrology principles, instrumentation of sensors and transducers.	On completion of the course, the student will be able to: 1. demonstrate the working of gauges and other devices used in measurement by following the principles of metrology 2. analyze the working of the devices for measuring component features considering physical and mathematical aspects of their working on the basis of their application and limitations. 3. learn about instrumentation by classifying various Sensors and transducers based on the aspect of their sensitivity and working range. 4. gain knowledge on strain gauges, Load cells and dynamometers by estimating their performance during working conditions 5. study the seismic transducers for the measurement of displacement, acceleration, pressure and temperature and choose a specific transducer based on working and ambient conditions

UNIT – I

Limits and Fits, ISO system: Fits and types of interchangeability. Taylor's principle of plain limit gauges, Use of plug, Ring and Snap gauges. Introduction– Linear and Angular measurements– Line and end standards. Slip gauges – Gauge material and manufacturing methods, Height gauges, Tomlinson gauges. Sine bar.

UNIT – II

Measurement of straightness and flatness, Auto collimator, Roundness measurement with bench centers and Talyrond, coordinate measuring machine in component geometries.

Surface Roughness Measurements – Numerical assessments, parameters as per ISO indices. Profilometer, Taylor Hobson Talysurf.

Gear measurement – Gear tooth thickness, Parkinson tester, General Geometric tests for testing machine tools – Lathe drilling and milling machines.

UNIT –III

Elements of instrumentation system: Concept of measurement measured, sensors and transducers. Static and dynamic characteristics. Types of errors. Calculation of Uncertainty, Calibration Procedures.Temperature measurement by thermocouples. Laws of thermo-electricity. Types of materials used in thermocouples. Series and parallel circuits. Ambient temperature compensation.

UNIT-IV

Displacement transducers. LVDT. Strain measurement – wire and foil type resistance strain gauges. Rosette Gauges. Adjacent arm and self-compensating gauges. Proving ring. Strain gauge load cells, measurement of axial load and torsion by strain gauges. Piezo electric load cell, Torque cells, dynamometers

UNIT – V

Introduction to Seismic Transducers – displacement and acceleration measurement, Pressure measurement – Bourdon pressure gauge, Bulk modulus gauge, Pirani gauge.

Introduction to data acquisition systems and signal processing.

Learning Resources:

1. Doeblin, "Measurement Systems application and design", 5th ed., Tata McGraw Hill, 2004.
2. Thomas G Beckwith, Roy D Marangoni, John H Lienhard V, "Mechanical Measurements", 6th Ed., Pearson Education Asia, 2007
3. Instrumentation Measurement and Analysis, B.C. Nakra, K.K. Chaudhry, 3rd Ed, McGraw Hill, 2014
4. R.K. Jain, "Engineering Metrology", Khanna Publications, 1996 I.C. Gupta –"A Text Book of Engineering Metrology", Dhanpat Rai Publications, New Delhi.

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

VIBRATION ANALYSIS AND NOISE CONTROL (PE-I)

Instruction: 3Hrs /week	SEE Marks : 70	Course Code : PE600ME
Credits : 3	CIE Marks : 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. formulate mathematical models and determine the characteristics of multi DOF and continuous system vibration. 2. demonstrate the basics of sound in space, classify noise measuring devices and noise control procedures	1. determine natural frequency of single degree of freedom vibratory system from equations of motion. 2. estimate the response of two degree of freedom vibratory system for given initial conditions. 3. analyse the multi degree of freedom vibratory system using energy and matrix methods. 4. examine the response of continuous systems for different modes. 5. summarize various vibration measurement devices and techniques for analyzing performance of vibrating systems.

Unit-I

Introduction: Relevance of and need for vibrational analysis – Basics of SHM - Mathematical modelling of vibrating systems - Discrete and continuous systems - single-degree freedom systems - free and forced vibrations, damped and undamped systems.

Unit-II

Multi Degree freedom Systems: Free and forced vibrations of multi-degree freedom systems in longitudinal, torsional and lateral modes - Matrix methods of solution-normal modes - Orthogonality principle-Energy methods, Eigen values and Eigen vectors

Unit-III

Continuous Systems: Torsional vibrations - Longitudinal vibration of rods - transverse vibrations of beams - Governing equations of motion - Natural frequencies and normal modes - Energy methods, Introduction to non linear and random vibrations.

Unit-IV

Basics of Acoustics: Speed of Sound, Wavelength, Frequency, and Wave Number, Acoustic Pressure and Particle Velocity, Acoustic Intensity and Acoustic Energy Density, Spherical Waves, Directivity Factor and Directivity Index, Levels and the Decibel, Addition and subtraction of Sound levels, Octave Bands, Weighted Sound Levels.

UNIT- V

Noise measurement and control: Sound Level Meters, Intensity Level Meters, Octave Band Filters Acoustic Analyzers, Dosimeter, Measurement of Sound Power, Impact of noise on humans, A-Weighting, Noise control strategy, sound absorption and insulation.

Learning Resources:

1. SS Rao, "Mechanical Vibrations ", 5th Ed., Prentice Hall, 2011
2. L.Meirovitch, "Elements of vibration Analysis", 2nd Ed., McGraw-Hill, New York, 1985.
3. W.T. Thomson, M.D. Dahleh, C Padmanabhan, "Theory of Vibration with Applications", 5th Ed.,Pearson Education, 2008.
4. Munjal M.L, Noise and Vibration Control, World Scientific, 2013
5. Beranek and Ver, Noise and Vibration Control Engineering: Principles and Applications, John Wiley and Sons, 2006.

Web Resources:

http://www.nptel.ac.in/courses/112103111
http://www.nptel.ac.in/courses/112103112

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

MANUFACTURE AND INSPECTION OF GEARS (PE-I)

Instruction : 3 Hours /week	SEE Marks : 70	Course Code : PE610ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: study the production of gears, material selection and hardening methods, gear finishing methods, gear inspection, modern gear production methods, and economical production of gears.	After completion of the course, the student will be able to: 1. outline the production of cylindrical gears. 2. explain the production of conical gears. 3. summarize material selection and hardening methods of gears. 4. examine gear finishing methods and gear inspection. 5. assess modern gear production methods and economical production of gears.

UNIT-I

Introduction to gears: Types of Gears, Classification, application of gears, gear boxes, drawings for gears, gear production method an over view, types of blank preparation.

Production of Cylindrical Gears: Procedure of cutting gears and obtainable quality in hobbing and gear shaping, cutter selection and work holding methods, setting calculations, rack type gear setting machine description and application, internal gear cutting methods, CNC gear hobbing and gear shaping machines.

UNIT-II

Production of conical gears: Production of straight bevel gears by bevel gear generator, duplex rotary cutter method, Gleason Reva cycle method, spiral and hybrid bevel gear generation, Description of machine cutter and machine setting.

UNIT-III

Gear material selection and Hardening methods: Properties of gear materials, non-metallic, non-ferrous and plastic gears, selection of material for power transmission, high speed application, selection of material for worm and wheel, Hardening by through hardening, case

hardening, induction hardening, flame hardening, nitriding and to finding hardening defects**.**

UNIT-IV

Gear finishing methods: Gear finishing advantages, finishing of gears by grinding, shaving, lapping and honing methods, cold rolling of gears-description of process, machine, cutters and process parameters setting

Gear Inspection: Type of gear errors-gear quality standards and allowable limits-tooth thickness, base tangent length measurement, pitch error, radial run-out, involute profile error measurement methods and analysis, composite error measurement, computerized gear inspection, gear failure reasons and remedies.

UNIT-V

Modern gear production methods: Gear production by stamping and casting powder metal process, injection and compression moulding of plastic gears cold and hot rolling, mass production methods , shear speed shaping, gear broaching Gleayson G-TRAC- gear generation methods.

Economica; and Quality production of Gears: Gear production systems-batch production, gear production cells, lean and agile production practices, automobile gear and gear boxes, heavy engineering production, gears for instruments and appliances, process and cutter selection for quality, cost and quality criteria.

Learning Resources:

1.Watson," Modern gear production", Pergamon press,1984
2.HMT Production Technology, Tata McGraw Hill, New Delhi,1982
3.Joseph R " Gear materials properties and manufacture, ASM international,2005

References:

1. SAE, "Gear Design Manufacturing inspection manual", SAE 1990
2. Weck M, "Hand book of machine tools", Technology and Sons 1984.
3. Gear technology magazine back volumes.
4. Faybor L Livin Alfonso Fuentes-Aznar Ignacio Gonzalez-Perez, and kenichiHayasaka, "Noncircular Gears Design and Generation", Cambridge University Press, 2009

With effect from the year 2018-19

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
COMPUTATIONAL FLUID DYNAMICS (PE-I)

Instruction : 3 Hours /week	SEE Marks : 70	Course Code : PE620ME
Credits : 3	CIE Marks :30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. equip the students with the necessary governing equations to use computational techniques to solve problems related to engineering flow problems 2. provide the essential numerical background for solving the partial differential equations governing the fluid flow and heat transfer	After completing the course, the student will be able to: 1. familiarize with the differential equations for fluid flow & heat transfer and apply numerical methods for their solution 2. find solution of partial differential equations to estimate the behaviour of the flow phenomena. 3. develop flow simulation code for heat transfer and fluid flow applications using FDM and FVM. 4. make use of different iterative methods to solve algebraic equations for Heat transfer and fluid flows 5. apply suitable grid generation methods to decompose the fluid /solid domain for obtaining the numerical solution

UNIT – I

Introduction to computational Fluid flows, CFF applications, comparison amongst Numerical, Analytical and Experimental approaches.

Review of the basic fluid dynamics: Continuity, Momentum and Energy equations, Navier Stokes equations, Reynolds and Favre averaged N– S equations. Heat transfer conduction equation for steady and unsteady flows, steady convection– diffusion equation.

Unit– II

Classification of partial differential equations – Elliptic, parabolic and hyperbolic equations. Physical examples of Elliptic, parabolic and hyperbolic partial differential equations, Well posed problem; Initial and boundary value problems.

Turbulence - Introduction, Mixing length model, K– epsilon turbulence model.

Unit– III

Concepts of Finite difference methods– forward, backward and central difference. Finite difference solution– 1-D steady state heat conduction without and with constant source term parabolic partial differential equations– Euler, Implicit method, crank Nicholson method.
Errors, consistency, stability analysis – Von Neumann analysis, convergence criteria

Unit– IV

Solution of System of Linear Algebraic Equations: Tridiagonal matrix algorithm (TDMA): Thomas algorithm Iteration methods: Jacobi, Gauss-Seidel and ADI methods.
Viscous incompressible flow, stream function– Vorticity method.
Introduction to grid generation– Types of grid –Structured and Unstructured grids– O,H,C; Grid quality parameters: Aspect Ratio, grid density, skewness, tet Vs hex.

Unit– V

Introduction to finite volume method: Finite volume formulations for diffusion equation, 1-D steady state heat conduction without and with constant source term convection diffusion equation: Central difference scheme, Upwind scheme, Exponential scheme, power law scheme. Solution algorithm for pressure velocity coupling in steady flows staggered grid, SIMPLE Algorithm.

Learning Resources:

1. John D Anderson, "Computational Fluid Dynamics", Mc Graw Hill Inc., New York, 2003.
2. Patankar S V, "Numerical Heat Transfer and Fluid Flow", Hemisphere Publishing Company, New York 1980.
3. H.K. Versteeg, W. Malalasekara, "An Introduction to computational Fluid Dynamics", 2nd Ed., Pearson Education, 2007.
4. Chung T J,"Computational Fluid Dynamics", Cambridge University Press, New York, 2002
5. Muralidhar K, Sundararajan T, "Computational Fluid Flow and Heat Transfer", Narosa publication House, New Delhi, 2003.

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

PRODUCTION AND OPERATIONS MANAGEMENT(PE-I)

Instruction : 3Hrs /week	SEE Marks : 70	Course Code : PE630ME
Credits : 3	CIE Marks: : 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: study the types of plant layout, forecasting methods, cost analysis, inventory control and project management.	On completion of the course, the student will be able to: 1. classify the types of plant layouts, production systems based on product using the facilities of the plant 2. estimate the future demand using forecasting methods through qualitative and quantitative models 3. determine the requirement of resources to minimise the total cost using aggregate planning techniques. 4. determine the optimal maintenance of inventory to minimise the total cost using different inventory models. 5. construct network models to estimate the project completion time using PERT and CPM techniques.

Unit– I

Production & Operations Management: Introduction, Types of Production Systems – Job shop, Batch, Flow shop. Types of business organizations and organization structures.

Plant location and layout: Factors affecting plant location, Break even analysis, plant layout objectives, types of layouts, merits and demerits.

Work Study: Introduction to method study and work measurement, standard time calculations, methods of rating, work sampling.

Unit– II

Forecasting: Introduction, forecasting objectives and uses, demand patterns, qualitative models – market survey, delphi, quantitative models – moving average, weighted moving average, simple exponential smoothing, trend adjusted exponential smoothing, least square method, simple regression, multiple regression.

Forecast Errors: mean absolute deviation (MAD), mean square error (MSE), Mean Forecast Error (MFE), mean absolute percentage Error (MAPE)

Unit– III

Costs: Elements of Cost, overheads, determination of selling price of a product**.**

Aggregate planning and master scheduling: Introduction, objectives of aggregate planning, cost in aggregate planning, strategies in aggregate planning, master production scheduling.

Materials requirement planning MRP: Importance of MRP, MRP system inputs and outputs, MRP calculations.

Unit– IV

Inventory Control: Importance of inventory control, types of inventory models, inventory costs deterministic inventory models – basic EOQ model derivation, production model without shortages, purchase model with instantaneous replenishment and with shortages, production model with shortages, inventory model with price breaks, fixed order quality system, periodic review system. ABC and VED analysis.

Unit– V

Project Management: Network fundamentals, differences between PERT and CPM, scheduling the activities, Fulkerson's rule, Earliest and Latest times, determination of ES and EF in forward path, LS & LF in backward path, determination of critical path, Free float, independent float, Total float, program evaluation and review technique, crashing of network.

Learning Resources:

1. Joseph Monk," Operations Management", TMH Publishers, New Delhi, 2004
2. Buffa Elwood S," Modern Production / Operations Management", John Wiley Publishers, Singapore, 2002
3. Everett, E. Adam. Jr and Ronald. J. Ebert, "Production and operations management: concepts, models and behaviour" Prentice Hall of India Pvt. Ltd., New Delhi, 5th ed. 1998.
4. Panneer Selvam R, "Production and Operations Management", 2nded, PHI Learning Pvt. Ltd., New Delhi, 2006.
5. S.D. Sharma, "Operations Research", Kedarnath, Ramnath& Co., Meerut, 2009.

DEPARTMENT OF H & SS

SYLLABUS FOR B.E.- VI SEMESTER
FINISHING SCHOOL – IV : SOFT SKILLS

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code :**HS610EH**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objectives	Course Outcomes
1. This course aims at enhancing the employability skills. Students will be trained in higher order thinking skills including analytical skills, problem solving skills and critical & logical reasoning skills. Students will be trained to work systematically and develop logical and analytical thinking. 2. Students will be trained in the following areas 1. Critical and Non-verbal reasoning 2. Pure Maths 3. Verbal ability 4. Logical reasoning 5. Data Interpretation and Analysis	**At the end of the course, students will be able to:** 1. Understand the fundamentals concepts of Aptitude and verbal skills 2. Solve questions using short cuts and smart methods 3. Perform calculations with speed and accuracy 4. Develop Analytical thinking and problem solving skills

UNIT I: VERBAL ABILITY

- Finding errors
- Vocabulary
- Synonyms
- Antonyms
- Idioms and Phrases
- Fill in the blanks and sentence Jumbles
- Reading comprehension

UNIT II : LOGICAL REASONING

- Logical Reasoning
- Assignments
- Puzzles
- Blood relations
- Syllogisms

UNIT III : CRITICAL AND NON VERBAL REASONING

- Critical Reasoning
- Nonverbal reasoning
- Figure series and completions

UNIT IV : QUANTITATIVE APTITUDE - PURE MATHS

- Pure maths
- Algebra
- Probability
- Permutations and combinations

UNIT V: DATA INTERPRETATION AND ANALYSIS

- Data Interpretation
- Line graph
- Pie chart
- Bar Graph
- Tabulations

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
Finishing School-IV (Technical Skills)

Instruction: 84 hrs	SEE Marks : 35	Course Code : MC610ME
Credits : 1	CIE Marks : 15	Duration of SEE: 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to :	At the end of the course, student will be able to:
acquire necessary skills to design solution for a given problem using Catia, Hyperworks and Python Programming.	1. Construct solid models and assemblies using Catia software for engineering applications 2. Analyse the mechanical components using Hyperworks software for engineering applications. 3. Acquire knowledge in basic and object oriented python for application to engineering problems. .

Unit I: HYPERWORKS (18 hours)

Introduction of CAD/CAE and short cut keys, Geometry clean-up - Creating of nodes- Temporary nodes- checking of distance points, Lines and Line edit- using of tool options (translate, rotate, mid surface etc.), HYPERMESH 1D, 2D, 3D elements- meshing- use short cut keys, Introduction of meshing- How to do sheet metal meshing, 2D Meshing, 2D Meshing with and without surface- FEM Checks, BIW meshing with rules and quality checks

Unit – II: HYPERWORKS (Contd.) (18 hours)

3D Meshing, HEXA meshing, Short notes on linear static and nonlinear analysis, Stress strain curve for ductile and brittle Materials , assign material properties - Boundary conditions, rigid, OptiStruct - Different types of analysis of sheet metal and solid, Tool Test on Assembly Component

Unit- III: CATIA V5 (18 hours)

Introduction to CATIA VS, Sketcher & Part Design · Profile Creation · Basic, Additional and Dress up Features · Reusing Data · Finalizing Design Intent, Assembly Design Content- Managing Parts & Appling

Constraints- Saving Assembly Files- Managing Product Structure- Design in Context,

Drafting- Use of ISO Standards Creation of Sheets- Title block Views- Creation Dimensioning and Annotations

Unit –IV: CATIA V5 (Contd.) (18 hours)

Generative Shape Design- Introduction- Surface Design- Creating Wire frame - Geometry reference- wire frame elements- create simple surfaces- Surface Operation.

Important case studies and practice models discussed during Training which are related to Aerospace, Automotive and Mechanical Domain.

UNIT –V : Python Programming (12 hours)

Python fundamentals, syntax, REPL and command line handling, if/else/elif blocks, Loops (while and for with and without else, how to break or continue loops) , Data Types, Operators in python, Objects in python , Mutable and immutable objects, List/Tuples/Dictionaries (how to use and types of operations)

Functions (how to define functions, type of positional or keywords arguments, default arguments, calling functions, returning values, pass by reference and/or value, variable length arguments), Modules and Packages (definitions, how to use modules, import & from statement , how to write your own modules), Classes in Python (definition, how to write a class, instance creation, role of init and self, data members, methods and it's invocations), String Handling, Exceptions (try/except/raise)

File Handling (read / write / append / seek / tell), Binary numbers - bitwise and/or etc., List comprehensions and it' applications, Lambda functions, Nested objects (List of dictionaries, List of lists etc.), Variables and its scope (global and nonlocal etc.), Boolean and/or etc, Type conversions (string toint/float etc.), Debugging python code.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
MACHINE TOOLS LAB

Instruction : 2 Hours /week	SEE Marks: 50	Course Code : PC611ME
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to • familiarise the student with various machine tools and machining operations. • analyse the machining process	On completion of the course the student will be able to: 1. classify different types of machine Tools based on metal cutting operation. 2. compute Various kinds of forces involved in turning operations. 3. interpret and grind Single Point Cutting Tool to the required Geometry &study of Multi Point cutting Tool Geometries 4. perform various operations on Lathe, Shaper, Milling , Drilling &planing Machines to produce required component.

List of Experiments

1. Eccentric turning operation on a lathe
2. Thread cutting and boring on a lathe
3. To make rectangular and 'V' grooves on a shaper.
4. To manufacture a spur gear using simple indexing on a milling machine.
5. Experimental determination of shear angle by measuring thickness and length of chips on a lathe
6. Measuring the cutting forces using Lathe tool dynamometer
7. Experimental determination of Taylor's constant and exponent for HSS and carbide tools
8. Measurement of cutting temperature using thermocouple on a lathe
9. Grinding of HSS tool using tool and cutter grinder to a given geometry.
10. PCD drilling on radial drilling machine and tapping.
11. Grinding of flat surfaces and measurement of surface finish.
12. Estimation of MRR using Electric Discharge Machine (EDM),
13. Manufacturing a component using 3D printing machine.
14. Demonstration of planing process on a planer machine.

Note: Minimum twelve experiments to be completed.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
DYNAMICS AND METROLOGY LAB

Instruction : 2 Hours /week	SEE Marks : 50	Course Code : PC621 ME
Credits : 1	CIE Marks : 25	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: 1. Understand the dynamic behaviour of mechanical systems like governors, cams, gyroscope, rotating machines and spring-mass systems. 2. Apply the principles of metrology in the measurement using various instruments and transducers.	On completion of the course, the student will be able to: 1. analyze the cam profile for different motion characteristics. 2. estimate the static and dynamic balancing of masses. 3. examine the gyroscopic effect for stabilization of vehicles. 4. determine the vibration response of free and forced vibrating systems 5. make use of the inspection gauges and various measuring instruments for applications such as measuring angles of a single point cutting tool and parameters of screw thread. 6. compare the performance of various thermocouples for temperature measurement and also learn about calibration of displacement transducer. 7. estimate the errors by performing geometrical tests on machine tools to find the deviations

LIST OF EXPERIMENTS
DYNAMICS LAB

1 To study the motion characteristics of the follower with the given profile of the cam.
2 To study the gyroscopic effect on a disc subjected to precessional motion.
3 To study the controlling force curves in dead weight and spring controlled centrifugal governors.
4 To determine the static and dynamic balancing masses in a rotating mass system.

5 Determination of critical speed of the shaft and to study free vibrations of spring mass system with and without damping.
6 To study the undamped and damped forced vibration of SDOF system.
7 To study the undamped and damped forced vibration of MDOF system.

METROLOGY LAB

1 Linear, angular & surface roughness measurements.
2 Angular measurements.
3 Design of snap gauge.
4 Measurement of chordal thickness of a gear tooth using Gear tooth vernier
5 Determination of screw thread angles using Toolmakers microscope
6 Determination of Tool Angles using Profile Projector
7 Alignment test on lathe machine.

Note: Minimum twelve experiments to be completed.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
CAD LAB

Instruction: 2 Hrs /week	SEE Marks : 50	Course Code : PC631ME
Credits : 1	CIE Marks : 25	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: 1. understand the modeling of the object using sketching, editing and develop part models in 3-D 2. understand assembly constraints and develop assemblies of machine components.	1. Create sketches using modeling software by using basic features. 2. Create models using advanced features for complex shaped parts. 3. Apply assembly constraints to make assemblies using part models.

1. Practice of 2D sketches.
2. Practice of 2D sketches through constraining concepts.
3. Solid modeling of basic 3D part models.
4. Solid modeling of critical 3D part models.
5. Developing of 3D part models using introducing arbitrary planes, datum planes etc.
6. Developing of gear profile, coil and helical springs, hexagonal headed bolt and nut.
7. Introduction of special features like pattern feature, sweeping, revolve & sweep along the guide.
8. Developing of pet bottles.
9. Assigning the material to the part models and adding esthetical sense to the part models.
10. Introduction of assemblies and its constrains.
11. Developing a journal bearing.
12. Developing Assemblies: Flange coupling, Plummer block, Universal coupling, Connecting rod.
13. Develop associated sketches for manufacturing of components.
14. Automatic conversion of 3D to 2D.

Note:
1) Above experiments are to be conducted using soft wares like NX & Catia.
2) Minimum twelve experiments to be completed.

LIST OF OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS

Open Elective VI (Semester - VI)			
Civil	Intelligent Transportation System	OE610CE	1
CSE	Introduction to Operating Systems	OE610CS	1
ECE	Consumer Electronics	OE610EC	1
EEE	Solar Power and Applications	OE610EE	1
IT	Introduction to Web Technologies	OE610IT	1
Mech.	Basics of Mechatronics	OE600ME	1
Open Elective VII (Semester - VI)			
Civil	Integrated Solid Waste Management	OE620CE	2
CSE	Introduction to Databases	OE620CS	2
ECE	Electronics for Automotive Applications	OE620EC	2
EEE	Programming For Engineers	OE620EE	2
IT	Statistical Programming using R	OE620IT	2
Mech.	Optimization Methods for Engineers	OE610ME	2
	Advances in Entrepreneurship	OE620ME	2

With effect from the year 2018-19

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. VI SEMESTER
INTELLIGENT TRANSPORTATION SYSTEMS (OPEN ELECTIVE – VI)

Instruction: 1 hr/ Week	SEE marks:50	Course Code :	OE610CE
Credits: 1	CIE marks:30	Duration of SEE :	2 hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	*Upon the completion of this course the students will be expected to:*
1. Impart knowledge on advanced transportation concepts in the field of ITS. 2. Introduce the technologies of ITS in solving transportation problems	1. Explain the concepts of ITS data collection techniques and its architectural framework. 2. Characterize ITS functional areas for transportation planning. 3. Describe the range of technologies involved in the delivery of ITS systems 4. Investigate and analyse the current applications and trends in the context of ITS 5. Present practical examples of ITS

UNIT I:

Introduction to Intelligent Transportation Systems (ITS): Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS - ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), video data collection, ITS architecture framework.

UNIT II:

ITS functional areas – Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS)

Suggested Books:

1. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.
2. Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E VI SEMESTER
INTRODUCTION TO OPERATING SYSTEMS (Open Elective-VI)

Instruction: 1 Hr /week	SEE Marks :50	Course Code :OE610CS
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course objective	Course outcomes
At the end of the Course students should be able to:	At the end of the Course students will be able to:
• Understand different Operating system Structures, Services and threading models	1. Differentiate Operating system structures to show thee valuation of an operating system 2. Analyze the role of an Operating system in executing tasks on a system 3. Distinguish single threaded and multi-threaded models of execution 4. Compare CPU scheduling algorithms to find effective algorithm for a given instance of process

UNIT-I

Introduction to operating systems: Definition, Mainframe, Multiprocessor, Clustered and Real time systems, Distributed, OS System structure, Unikernel, OS Services, Virtual machines, Containers, System calls.

UNIT-II

Process: Process concept, Process Scheduling, Inter-process communication, Threads, Multithreading Models.

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiprocessor scheduling.

Suggested Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th Edition (2016), Wiley India.

Reference Books:

1. Andrew S. Tanenbaum, Modern Operating Systems, 2nd Edition (2001), Pearson Education, Asia.
2. Dhananjay, Dhamdhere.M, Operating System-concept based approach, 3rd edition (2009), Tata McGraw Hill, Asia
3. Robet Love, Linux Kernel Development, (2004)Pearson Education
4. Richard Stevens, Stephen Rago, Advanced Programming in the UNIX Environment, 3rd Edition (2013), Pearson Education

Online Resources:

https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

CONSUMER ELECTRONICS (Open Elective -VI)

(for other Departments)

Instruction: 1 Hrs /week	SEE Marks : 50	Course Code :**OE610EC**
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objective	Course Outcomes
1. Upon completion of the subject, the student shall know the basics of Electronics, operations of various Audio & Video Systems, Office & Home appliances and advance consumer electronic gadgets used in our day-to-day actives.	**At the end of the course, students will be able to:** 1. List technical specification of electronics Audio / Video systems. 2. Understand the working of microphones and speakers and their application in Audio systems. 3. Understand the basic functions of consumer electronic goods like cell phones, ATMs. 4. Troubleshoot consumer electronic products like TV, Washing machine and AC.

UNIT - I

Brief history and development of Electronics – Basic Electronic Components - DC & AC –Sources, Kirchoff's Laws, ADCs, Frequency spectra - Ranges (Audio, Video, RF UHF, VHF, Microwave), Audio System - working principles, components - Microphones and Speakers, Principles of Video Processing and Displays (LCD, LED displays), Analog and Digital Video standards.

UNIT - II

Telecommunication Systems: Basics of Telephone system, Caller ID Telephone, Intercoms, Cordless Telephones, Cellular mobile systems, Basics of satellite communication.

Office Electronics: Automatic Teller Machines, Facsimile machines, Digital Diaries, Safety and security systems.

Home Electronics: Digital Camera system, Microwave ovens, Washing Machines, Air Conditioners and Refrigerators, Troubleshooting.

Suggested Reading:

1. Mitchel Schultz 'Grob's Basic Electronics', Mc Graw Hill Publishers, 12/e, 2016.
2. A.M. Dhake 'Television and Video Engineering', McGraw Hill Education, 2/e, 2014.
3. B.R. Gupta and V. Singhal, "Consumer Electronics", S.K. Kataria& Sons, 2013.
4. R.R.Gulati. 'Monochrome and Color Television' New Age International Publisher, 2/e, 2010.
5. S.P. Bali, 'Consumer Electronics', Pearson Education, 2008.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SYLLABUS OF B.E VI- SEMESTER

SOLAR POWER AND APPLICATIONS (Open Elective – VI)

Instruction: 1 Hr /week	SEE Marks :50	Course Code :OE610EE
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course objective:	Course Outcomes:
To impart the basics of solar energy harnessing and solar panel and array.	A student will be able to 1. Identify and choose proper type of meter for solar radiation measurement. 2. Use proper solar PV system according to the load requirements. 3. Categorize and compare photovoltaic cells. 4. Apply the knowledge of solar energy.

Unit – I

Solar Energy Basics: Sun as a source of energy, the Earth, Radiation Spectrums, Extraterrestrial and Terrestrial Radiations, Depletion of solar Radiation, Pyranometer, Pyrheliometer, Sunshine Recorder, Solar Collectors, Solar Water Heater, Solar Cookers and Solar Thermo-Mechanical Systems.

Unit – II

Solar Photovoltaic Systems: Solar Cell fundamentals, Cell characteristics, Cell classification, Module, Panel and Array, Maximizing the Solar PV output and load matching, MPPT, Stand-Alone Solar PV system, Grid-Interactive Solar PV system, Water Pumping and lighting.

Suggested Reading:

1. B H Khan, Non-Conventional Energy Resources, 2nd Edition, Tata McGraw Hill.
2. G. D. Rai, Non-Conventional Energy Sources, 13th Reprint 2014, Khanna Publications.

Online Resource:

1. https://drive.google.com/file/d/
2. www.pdfdrive.net
3. www.edx.org

DEPARTMENT OF INFORMATION TECHNOLOGY

SYLLABUS OF B.E VI- SEMESTER

INTRODUCTION TO WEB TECHNOLOGIES (Open Elective-VI)

Instruction: 1 Hrs /week	SEE Marks :50	Course Code :OE610IT
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objectives	Course Outcomes
The course will enable the students to:	**At the end of the course student will be able to:**
Acquire basic skills for designing static and dynamic Web Applications using HTML, CSS and Javascript.	1. Develop and publish Web pages using Hypertext Markup Language . 2. Optimize page styles and layout with Cascading Style Sheets. 3. Make use of concepts in Java script for creating a dynamic web applications. 4. Implement event handlers to respond to various events.

UNIT-I:

Introduction: World Wide Web, Web Browsers, Web Servers, URL, HTTP. HTML: Standard HTML document structure, Basic Tags, Images, Hypertext Links, Lists, Tables, Frames. CSS: In-line style sheets, Internal Style sheets and External Style sheets.

UNIT-II

JavaScript: Introduction, Basics of java script-variables, data types and operators, Control Structures, Arrays, Functions, HTML Forms, Events and event handling.

Learning Resources:

1. "Web Technologies", 7th Edition, Uttam K.Roy,2012.
"Internet & World Wide Web How to Program", 5/e, Paul J. Deitel, Harvey M. Deitel, Abbey Deitel,2012**.**

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

BASICS OF MECHATRONICS (OPEN ELECTIVE -VI)

Instruction:1Hrs /week	SEE Marks : 50	Course Code : OE600ME
Credits : 1	CIE Marks: : 30	Duration of SEE : 2Hrs

Course objectives	Course Outcomes
The objectives of this course are to: 1. identify the need for mechatronics and its applications 2. study various fluid power systems 3. access various electronic components and devices and design mechatronic systems	On completion of the course, the student will be able to: 1. interpret the importance of mechatronics and elements involved 2. design various fluid power systems for mechatronics applications. 3. Study various industrial electronic devices and integrated circuits. 4. analyze various measurement systems and and to study micro controller based CNC machines.

UNIT – I

Introduction to mechanization & automation.

Concept of Mechatronics: Flow chart of mechatronics systems, Actuators and control system, Application in industries.

Introduction to drive mechanisms and electrical actuators: servo motors and stepper motors.

Introduction to fluid power systems: Industrial pneumatics and hydraulics, Merits of fluid power systems, Pneumatic and hydraulic elements and their symbols, Study of hydraulic control values, pumps & accessories, Hydraulic circuits and electro – hydraulic circuits.

UNIT – II

Introduction to industrial electronic devices: Diodes, Transistors, Silicon controlled Rectifiers (SCR), Integrated Circuits (IC)

Measurement systems: sensors, digital-to-analog and analog–to–digital conversion.

Introduction to microprocessor & micro controller: Applications of mechatronics in the design of modern CNC machines.

Learning Resources:

1. W. Bolton, "Mechatronics", 3rd Ed., Pearson Education, India, 2007
2. HMT Limited, "Mechatronics, Tata Mc.Graw– Hill Publishing Company Limited; New Delhi, 1998.
3. Michael B Histand& David G. Alciatore, "Introduction to Mechatronics and Measurement systems", 4th Ed., Tata McGraw-Hill International edition, 2012

With effect from the year 2018-19

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE VI-SEMESTER
INTEGRATED SOLID WASTE MANAGEMENT (Open Elective – VII)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE620CE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to	*Upon the completion of the course, students are expected to*
1. Integrate technical solid waste management options and imposed environmental legislation for the guidance to the safe solutions.	1. Assess the implications of production, characteristic and environmental impact of Solid Waste Management based on its sources. 2. Assess the components of Biomedical and Radioactive wastes. 3. Narrate the management methods based on standards. 4. Outline the phases of generation to disposal of E-waste with the global strategic terms of Recycling

UNIT-I

Solid Waste and their Handling: Definition of solid wastes — types of solid wastes — Sources – Industrial, mining, agricultural and domestic — Characteristics. Solid waste Problems – impact on environmental health

UNIT-II

Biomedical Waste Management: Classification, collection, segregation Treatment and disposal.

UNIT-III

Radioactive waste: Definition, Low level and high level radioactive wastes and their management, Radiation standards.

UNIT-IV

E-Waste Management: Waste characteristics, generation, collection, transport and disposal, regulatory aspects of e waste, global strategy, recycling.

Learning Resources:

1. Hazardous waste management by Prof. Anjaneyulu.
2. Standard handbook of Hazardous waste treatment and disposal by Harry M. Freeman, McGraw Hill 1997.
3. Management of Solid waste in developing countries by Frank Flintoff, WHO regional publications 1976.
4. http://nptel.ac.in/courses/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR BE VI SEMESTER
INTRODUCTION TO DATABASES (Open Elective-VII)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE620CS
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, students will be able to
• Identify different issues involved in the design and implementation of a database system. • Understand transaction processing.	1. Identify the functional components of database management system. Create conceptual data model using Entity Relationship Diagram 2. Transform a conceptual data model into a relational model 3. Design database using normalization techniques 4. Apply indexing and hashing techniques for effective data retrieval

UNIT-I

Introduction: Database System Application, Purpose of Database Systems, View of Data, Database Languages, Relational Database, Database Architecture, Database Users and Administrators.

Database Design and E-R Model: Overview of the Design Process, the E-R Model, Constraints, E-R Diagrams.

UNIT-II

Relational Model: Structure of Relation Database, Relational Algebra Operations, Modification of the Database.

Structured Query Language: Introduction, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Views, Join Expressions.

UNIT-III

Relational Database Design: Features of Good Relational Designs, Atomic Domains and first Normal form, Decomposition Using Functional Dependencies, functional Dependency Theory.

UNIT-IV

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, B-Tree Files, Multiple – Key Access, Static Hashing, Dynamic Hashing.

Transaction Management: Transaction concept, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation and Atomicity, Serializability, Recoverability.

Suggested books:

1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.

Reference Books:

1. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System , 8th Edition(2006) Pearson Education.
2. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.
3. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
4. Peter rob, Carlos coronel, Database Systems, (2007), Thomoson.

Online resources:

1. http://nptel.ac.in/courses/106106093/

With effect from the year 2018-19

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

ELECTRONICS FOR AUTOMOTIVE APPLICATIONS

(Open Elective-VII)

(for other Departments)

Instruction: 2 Hrs /week	SEE Marks : 70	Course Code :**OE620EC**
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. The student shall know the basics of Electronics for Automotive Applications, operation of various electronics modules 2. The student shall know the various transducers and sensors used in automotive environment 3. The student shall acquire good knowledge about various electronic modules	**At the end of the course, students will be able to:** 1. Appreciate the operation of various electronic modules, their functionality 2. Understand various functions of modules like EBD, ABS, cruise control etc 3. Understand the Advanced Driver Monitoring Systems (ADMS) and safety sensors in automotive environment 4. Appreciate the advances in automotive electronic systems like driverless cars, collision avoidance systems etc.

UNIT – I

Introduction to sensors and transducers: displacement, position, proximity, acceleration, velocity, motion, rotation, force, fluid pressure, liquid flow, liquid level, temperature, light, smoke, and gas sensors. Selection of sensor.

UNIT – II

Data acquisition and Signal conditioning: various signal conditioning modules. Use of data acquisition. Fundamentals of Analog to digital conversion, sampling, amplifying, filtering, noise reduction. Criteria to choose suitable data acquisition equipment.

UNIT – III

Introduction to systems: Measurement and control. Basic system models. Mathematical models. Mechanical system building blocks, Electrical

system building blocks, Fluid system building blocks and Thermal system building blocks. Engineering systems: Rotational – translational, Electromechanical, hydraulic-mechanical.

UNIT – IV

Engine management systems – Various sensors used in system – Electronic transmission control vehicle safety system – Electronic control of braking and traction.

Body electronics – Infotainment systems – Navigation systems – Application of Control elements and control methodology in automotive System.

Suggested Reading:

1. Tom Denton "Automobile Electrical and Electronic Systems" 5/e, Routledge, 2017.
2. De Silva, " Mechatronics", First Indian Reprint, (Taylor & Francis), Yesdee Publications, 2013.
3. William B. Ribbens, "Understanding Automotive Electronics: An Engineering Perspective" 7/e, Butterworth–Heinemann, 2012.
4. W. Bolton, "Mechatronics: Electronic control systems in mechanical and electrical Engineering", 3/e, Pearson Education, 2008.

With effect from the year 2018-19

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SYLLABUS OF B.E VI- SEMESTER
PROGRAMMING FOR ENGINEERS (Open Elective – VII)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : **OE620EE**
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	Course Outcomes:
To provide fundamental knowledge of programming language for solving problems.	A student will be able to 1. Use arrays and matrices for numerical problems solving. 2. Represent data and solution in graphical display. 3. Create easily programmable graphical user interface. 4. Write scripts and functions to easily execute series of tasks in problem solving.

Unit – I

Working with matrices and arrays:

Generating matrices, load functions, M-files, Concatenation, deleting rows and columns, linear algebra, arrays, multivariate data, scalar expansion and logic scripting.

Unit – II

MATLAB Plotting:

Plotting process, graph components, figure tools, arranging graphs, select plot types, editing plots and basic plotting functions.

Unit – III

Graphics:

Printing Graphics, Handle Graphics and animations.

Creating GUI:

Layout of GUI and programming a GUI.

Unit – IV

Programming:

Flow control, other data structures, scripts and functions.

Suggested Regarding :

5. Getting started with MATLAB (Version 7) The Math works.
6. Getting started with MATLAB "A quick introduction for scientist and engineers by Rudra Pratap, Oxford publications.

With effect from the year 2018-19

DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS OF B.E VI- SEMESTER
STATISTICAL PROGRAMMING USING R (Open Elective-VII)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code :OE620IT
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
The course will enable the students to:	**At the end of the course student will be able to:**
The course will enable the students to apply the R programming language in the analysis of Statistical data.	1. Write simple programs in R language to manipulate and visualize the data. 2. Write complex program using different constructs of R language to solve simple problems. 3. Use R programming language in the simulation of different types of random variables. 4. Write programs using R language in the analysis and computation of different matrix operations.

Unit I: Introduction to R Language

Basic features of R, Built-in functions, logical vectors and relational operators, Data input and output, programming statistical graphs- High-level plots, low level graphic functions.

Unit II: Programming with R

Flow control, Managing complexity through functions, Miscellaneous programming tips, Debugging and maintenance, Efficient programming.

Unit III: Simulation

Montecarlo simulation, Generation of pseudo random numbers, Simulation of other random variables-Bernouli, Binomial, Poisson, Exponential and Normal random variables.

Unit IV: Computational Linear Algebra

Vectors and matrices in R, Matrix multiplication and inversion, Eigen values and Eigen vectors

Suggested Reading:

1. A first Course in Statistical Programming with R, W. John Braun, Duncan J. Murdoch, Cambridge University Press, 2007.
2. https://cran.r-project.org/manuals.htm

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
OPTIMIZATION METHODS FOR ENGINEERS
(OPEN ELECTIVE -VII)

Instruction : 2 Hours /week	SEE Marks : 70	Course Code : OE610ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objective of this course is to: understand Linear & non-linear programming, transportation modeling , CPM & PERT for project scheduling and control.	On completion of the course, the student will be able to: 1. explain simplex, dual simplex, revised simplex and sensitivity analysis for shop floor problems. 2. Solve transportation model problems and their optimization using Modi method. 3. apply unconstrained and constrained methods like Univariate, steepest descent, Newton etc. for Non linear programming. 4. apply the techniques like CPM and PERT for project management.

Unit-I
Optimization-An overview
Meaning of Optimization-Origin of Optimization-Introduction to Linear programming problems (LPP) -Formulation of LPP- Graphical method, simplex method

Unit-II
Advanced topics in Linear programming
Duality in LPP, Differences between primal and dual, Dual simplex method, Revised simplex method, sensitivity analysis

Unit-III
Transportation Model
Definition of the transportation model-matrix of Transportation model-Formulation and solution of transportation models- Methods for calculating Initial basic feasible solution-Optimization of transportation model using MODI method.

Unit-IV

Non linear programming problems

Optimization methods for single variable, multivariable functions, Maxima-Minima; Non linear programming unconstrained optimization: Random search, Univariate model;Non linear programming constrained optimization: Steepest descent, Conjugate Gradient, Newton.

Project Scheduling

Introduction to network analysis, Rules to draw network diagram, Fulkerson rule for numbering events, Critical path method, PERT.

Learning Resources:

1. ErPrem Kumar Gupta and Dr. DS Hira, "Operations Research ", S.Chand& Company Pvt. Ltd., 2014.
2. NVS Raju, "Optimization methods for Engineers ", PHI Learning Pvt. Ltd. ., 2014
3. SingiresuS.Rao, "Engineering optimization- Theory and Practice", 4th Edition, John Wiley and Sons, 2009.
4. R. Paneerselvam, "Operations Research", PHI Learning Pvt Ltd., 2009.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
ADVANCES IN ENTREPRENEURSHIP (OPEN ELECTIVE -VII)

Instruction : 2 Hrs/week	SEE Marks : 70	Course Code : OE620ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of the course is to 1. understand how to expand business and increase revenues. 2. understand various aspects of finance. 3. understand legalities of running a business.	After completion of the course, the student will be able to 1. understand growth strategies of a start-up & to identify ways and means of expanding customer base. 2. understand customer retention strategies. 3. develop ways and means of growing revenues and develop financial modelling. 4. understand legal formalities and IPR.

UNIT-I

Orientation to Growth: Stages of a Start-up Company, Infant Mortality of Start-up's, Sustaining the Phase of Launching, Growth Opportunities, Diversification and Expansion of Business, Growth Assessment, SWOT Analysis, Growth strategies adopted by Ideal Start-up, Ansoff Growth Matrix, Six ways of Adjacencies for Growth. Case Study of Nike.

Expanding Customer Base: Customer Segmentation: Division of market into segments, Evaluating the Profitability of Segments. Developing Business Model in relation to the current customers. Changing customer segments and revisit of Business Models. Evaluation of Business Models for new customer segments. Critical evaluation of Business Models Old Vs New. Risk of changing the Business Models. Analyzing the scalability of business model using Break Even Analysis.

UNIT-II

Traction and Business: Meaning of Business Traction Process, and Metrics to Measure Business Traction, Customer Retention, Customer Churning, Relationship Business, Customer Life Time Value. Identifying the unnecessary moves in business traction. Traction of business model using Bull's-eye framework. Measuring the effectiveness of selected channels. Budgeting and Planning.

UNIT-III

Growing Revenues: Identifying Growing Revenues, Stabilising growing revenues, Developing additional revenues (licensing and franchising). Exploring New channels and Partnerships for growth revenues. Evaluating the Growth streams based on longevity. Lean Start-up Canvas.

Sales Planning & Financial Modelling: Understanding the customer buying decision behaviour, setting sales plans, sales targets, Art of Pitching the sales, Selling Process, Building a professional sales team, Sales management. Price Sensitivity of Market. Optimisation of cost and operational expenses. Financial modelling of the Venture, Assessment of competitors and Peer's financial models.

UNIT-IV

Support System: Legal Management in Start-ups: Issues and Legal constraints effecting the business. Need for professional services: Legal consultancy and Accounting. Need for proper documentation for fool-proof administration of business. Intellectual Property rights and their importance. Business Mentoring, role of experts in managing business.

Learning Resources:

1. Entrepreneurship Rajeev Roy "”oxford,2012
2. Fundamentals of Entrepreneurship Nandan H,PHI,2013
3. Robert D Hisrich, Michael P Peters , Dean A Shepherd, Entrepreneurship , Sixth Edition, New Delhi, 2006.
4. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi,2001