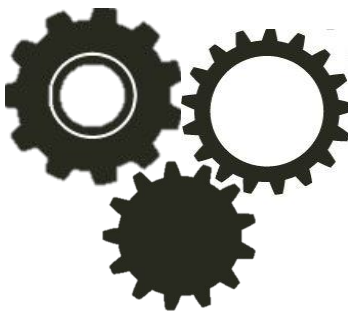# VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
Ibrahimbagh, Hyderabad-31

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 2019-20
(For the students admitted in 2017-18)

DEPARTMENT OF MECHANICAL ENGINEERING

+91-40-23146060, 23146061
Fax: +91-40-23146090
Website: www.vce.ac.in

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING

Course Code	Course Title	Hours per Week L	Hours per Week T	Hours per Week D/P	Duration in Hrs	Maximum Marks SEE	Maximum Marks CIE	Credits
B.E (MECH) V Semester								
		Scheme of Instruction			Scheme of Examination			
THEORY								
HS040EH	Economics and Finance for Engineers	2	-	-	3	60	40	2
HS510EH	Finishing School-III : Soft Skills	1	-	-	2	40	30	1
PC510ME	Hydraulic Machines	3	-	-	3	60	40	3
PC520ME	Machine Design	3	-	-	3	60	40	3
PC530ME	CAD / CAM	3	-	-	3	60	40	3
PC540ME	Manufacturing Processes	3	-	-	3	60	40	3
OE5XXXX	Open Elective –IV	3	-	-	3	60	40	3
MC040EH	Human Values and Professional Ethics – II	1	-	-	2	40	30	1
MC510ME	Finishing School- III: Technical Skills	1	-	-	2	40	30	1
PRACTICALS								
PC511ME	Fluid Mechanics and Hydraulic Machines Lab	-	-	2	3	50	30	1
PC531ME	CAD / CAM Lab	-	-	2	3	50	30	1
PC541ME	Manufacturing Processes Lab	-	-	2	3	50	30	1
	TOTAL	20	-	6		630	420	23
	GRAND TOTAL	26				1050		23

1) Student should acquire one online certificate course during III semester to VIII semester
2) Left over hours allotted to Sports / Library / Proctorial Interaction / CC / RC / TC / CCA / ECA

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities and Social Sciences

ECONOMICS AND FINANCE FOR ENGINEERS
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: **HS040EH**
Credits :02	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	COURSE OUTCOMES *On completion of the course, students will be able to*	
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

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: | 02 | Max.Marks for each Internal Tests: | 30 |

2   No. of Assignments: | 03 | Max. Marks for each Assignment: | 05 |

3   No. of Quizzes: | 03 | Max. Marks for each Quiz Test: | 05 |
    Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities and Social Sciences

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

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: **HS040EH**
Credits :01	CIE Marks:30	Duration of SEE: 2 Hours

	COURSE OBJECTIVE		**COURSE OUTCOMES** *On completion of the course, students will be able to*
1	Students will be introduced to higher order thinking skills and problem solving on the following areas – Arithmetic ability, Numerical ability and General reasoning.	1	solve questions on the above mentioned areas using short cuts and smart methods.
		2	understand the fundamentals concept of Aptitude skills.
2	Students will be trained to work systematically with speed and accuracy while problem solving.	3	Perform calculations with speed and accuracy.

UNIT-I QUANTITATIVE APTITUDE - NUMERICAL ABILITY

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

UNIT-II: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY FOUNDATION

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

UNIT-III: REASONING ABILITY – GENERAL REASONING PART 1

- Coding decoding
- Directions
- Series completions - Letter, Number & Element Series

UNIT 4 REASONING ABILITY- GENERAL REASONING PART 2

- Analogies
- Classification
- Alphabet test
- Blood Relations

UNIT 5 REASONING ABILITY- ARITHMETIC REASONING

- Mathematical operations
- Ranking
- Ages
- Clocks & Calendars

Learning Resources:

1. scoremore.talentsprint.com

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: | 02 | Max.Marks for each Internal Tests: | 20 |

2   No. of Assignments: | 02 | Max. Marks for each Assignment: | 5 |

3   No. of Quizzes: | 02 | Max. Marks for each Quiz Test: | 5 |
     Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

HYDRAULIC MACHINES
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC510ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able 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.	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 versus 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 and double acting hydraulic cylinders.

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.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1 No. of Internal Tests: 02   Max. Marks for each Internal Test: 30

2 No. of Assignments: 03   Max. Marks for each Assignment: 05

3 No. of Quizzes: 03   Max. Marks for each Quiz Test: 05
   Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

MACHINE DESIGN
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC520ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	COURSE OUTCOMES *On completion of the course, students will be able to*	
The objective of the course is to study the design of curved beams, springs, gears, bearings and I.C. engine parts.	1	design curved beam for machine frames, C -clamps and crane hook under pure bending condition.
	2	design of helical and leaf springs under direct and eccentric loading for various applications.
	3	design of gears under strength and wear conditions for power transmission.
	4	design sliding and rolling contact bearings for supporting shafts /axles.
	5	estimate the stresses in I.C. Engine parts under strength and thermal loading conditions.

UNIT-I: CURVED BEAMS
Beams with initial curvature – rectangular, circular and trapezoidal sections. Design of crane Hooks, machine frames and C- clamps.

UNIT-II: 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-III: 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-IV
Bearings: Materials used for Bearings, Classification of bearings. 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.

UNIT-V: I.C. ENGINE PARTS
Design of piston, connecting rod and crank shafts (single throw and overhang).

Learning Resources:

1. V.B. Bhandari, "Design of Machine Elements", 4th Edition, McGraw–Hill Publications, 2017.
2. M.F. Spotts, "Design of Machine Elements", 7thEdition, Pearson Education, 2003.
3. P.C. Sharma & D.K. Aggarwal, "Machine Design", 10th Edition, S.K. Kataria& Sons, 2003.
4. J.E. Shigley, C.R. Mischke, R.GBudynas "Mechanical Engineering Design", 6th Edition, Tata McGraw Hill Publications, 2003.
5. N.C Pandya and CS Shah, "Machine Design" Charotar publishing House, 2006.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: $\boxed{02}$ Max. Marks for each Internal Test: $\boxed{30}$

2   No. of Assignments: $\boxed{03}$ Max. Marks for each Assignment: $\boxed{05}$

3   No. of Quizzes: $\boxed{03}$ Max. Marks for each Quiz Test: $\boxed{05}$
    Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

CAD / CAM
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC530ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*	
The objective of the course is to analyze different types of modelling techniques, learn 2D transformations, understand numerical control machines, parts classification and coding system, process planning and flexible manufacturing system, discuss GT, CAPP, FMS and CIM.	1	compare the different types of modeling techniques and explain the central role solid models play in the successful completion of CAD/CAM-based product development.
	2	develop transformations for 2D geometric modeling.
	3	explain the basic concepts of CNC machines and their programming.
	4	explain the importance of group technology, computer aided process planning, flexible manufacturing system.
	5	understand the latest technologies in computer aided manufacturing.

UNIT-I
Introduction to computer aided design and manufacturing.
Geometric modeling: Wire frame modeling: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

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

Solid modeling: C– rep and B– rep and feature instancing approaches.

2D Transformation and their mathematics: Translation, scaling, rotation, shearing and reflection about arbitrary points. Concatenated transformations.

CAD Database and Data exchange: CAD Database and structure, IGES and PDES format.

UNIT-III: NUMERICAL CONTROL OF MACHINE TOOLS

Features and elements of NC. Positional, paraxial and contouring types. Definitions of axes, Definitions of interpolation, post– processor, preparatory and miscellaneous functions, canned cycles, tool length and cutter radius compensation. CNC programming using G and M codes for simple turning and milling operations.

UNIT-IV

Computer Numerical Control: CNC, DNC and adaptive control systems. Typical configurations and relative features. Machining centers, Introduction to FANUC, SINUMERIC controllers.

Industrial Robots: Robot Anatomy, Configurations, Controls, Drivers, Programming methods and applications.

UNIT-V

Group Technology: Part families, layout, part classification and coding system.

Computer Aided Process Planning: Variant and Generative process planning.

Flexible Manufacturing System & Computer Integrated Manufacturing System: Building blocks of Flexible Manufacturing systems and their control, Elements of CIMS. CAD/CAM Integration, Introduction to 3D printing and Reverse Engineering.

Learning Resources:

1. Arvid R. Eide, Roland D. Jenison, Lane H. Mashaw, Larry L. Northup, "Introduction to Engineering Design", Mc Graw– Hill, 1998.
2. Ibrahim Zeid, "CAD/CAM, Theory and Practice", McGraw Hill Inc. New York, 2011.
3. Grover, MP and Zimmers E.W., CAD/CAM, Prentice Hall of India, 1989.

4. Rao P.N., "CAD/CAM: Principles and Applications", 2nd Edition, Tata McGraw Hill, New Delhi, 2004.
5. YoramKoren, Computer Control of Manufacturing Systems, McGraw Hill Inc. New York, 1994.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: | 02 | Max. Marks for each Internal Test: | 30 |

2   No. of Assignments: | 03 | Max. Marks for each Assignment: | 05 |

3   No. of Quizzes: | 03 | Max. Marks for each Quiz Test: | 05 |
    Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

MANUFACTURING PROCESSES
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC540ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
	On completion of the course, students will be able to
The objective of the course is to study various types of casting, welding and forming processes.	1 design riser and gating system to produce required casting in sand molding process.
	2 examine special casting processes to suit various production requirements based on applications.
	3 understand the techniques of solid state and arc welding processes to join different materials.
	4 identify and select special welding process based on the application.
	5 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 , Numerical problems on Pouring Time, Riser Design and Time taken to fill the mould in different gating systems.

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, Numerical Problems on Arc Welding characteristics, Duty cycle, welding efficiency, 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, Numerical problems on Resistance welding.

UNIT-V: FORMING PROCESSES

Cold & Hot working, Yield criteria, Process description of Forging, Rolling, Extrusion, Wiredrawing, Blanking, Piercing, Bending, Deep drawing, Stretch forming, Spinning. Numerical problems on Rolling, drawing, shearing and deep drawing operations.

Learning Resources:

1. P.N.Rao, "Manufacturing Technology," Vol. 1, 3rd Edition, Tata McGraw Hill Publ., 2011.
2. Amitabh Ghosh &Mallik, "Manufacturing Science", 4thEdition, Assoc. East west Press Pvt. Ltd., 2011.
3. Roy A. Lindberg, "Materials & Process of Manufacturing", 5th Edition, Prentice Hall of India, l992.
4. Serope Kalpakjian, "Manufacturing Engineering and Technology", Addison, 7th Edition Wesley Publishing Company, 2006.
5. George.E. Dieter, "Mechanical Metallurgy", 4th Edition McGraw-Hill Book Company, 1988.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30

2	No. of Assignments:	03	Max. Marks for each Assignment:	05

3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities and Social Sciences

Human Values and Professional Ethics-II
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: **HS020EH**
Credits :01	CIE Marks:30	Duration of SEE: 02 Hours

	COURSE OBJECTIVE		COURSE OUTCOMES
			On completion of the course, students will be able to
1	Get a holistic perspective of value- based education.	1	gain a world view of the self, the society and the profession.
2	Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations.	2	start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals.
3	Understand professionalism in harmony with self and society.	3	inculcate Human values into their profession.
4	Develop ethical human conduct and professional competence.	4	obtain a holistic vision about value-based education and professional ethics.
5	Enrich their interactions with the world around, both professional and personal.		

UNIT-1 PERSONAL ETHICS AND PROFESSIONAL ETHICS
a. **PERSONAL ETHICS**: A person 's personal or self-created values and codes of conduct. Civic virtues and Civic sense.

b. **NEED FOR ETHICAL CODES**
Code of Professional Ethics- Observance of the code, Obligations towards the Features of professional ethics: Openness, Transparency, Privacy, Impartiality, Practicality, Loyalty.
Profession, Ethics and Information Security, Deterring Unethical and Illegal Behaviour, Work ethics.

UNIT-2 GENDER SENSITISATION

a. Social issues regarding women - Female infanticide and foeticide, dowry & property rights, violence against women.
b. Impact of globalization on the status of women - Political and legal empowerment
c. Women at work- Success stories.

Post independence and current movements in India (Telengana movement 1948-50, Chipko movement 1973, Navnirman movement 1974, question of Representation in Politics)
Change makers - Shashi Deshpande, Taslima Nasreen, Kumkum Sangari, Veena Mazumdar, Neera Desai.

Women's Studies in India--UGC's initiatives -- Centers for Women's Studies- Capacity building for Women leaders in education—Women development cells-- Women's Studies in the XIth Plan.

Women role models -- Case studies– Indira Gandhi, Kiran Mazumdar, Kiran Bedi, Ela Bhatt, Mother Teresa, PT Usha, Rukminidevi Arundale, Annie Beasant, Sarojini Naidu, Medha Padhkar, Kalpana Chawla, etc.}

MODE of DELIVERY

• **Questionnaires** • **Quizzes** • **Case-studies** • **Observations and practice** • **Home and classroom assignments**	• **Discussions** • **Skits** • **Short Movies/documentaries** • **Team tasks and individual tasks** • **Research based tasks** • **Viva**

Relevant Websites, CD's and Documentaries

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

Learning Resources:
1. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
2. B.L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
3. A.N Tripathy, 2003 Human values, New Age International Publishers.
4. EG Seebauer & Robert L. Berry,2000, Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests (along with II int):	01	Max. Marks for the Internal Test:	20
2	No. of Assignments:	1	Max. Marks for the Assignment:	05
3	No. of Quizzes:	1	Max. Marks for the Quiz Test:	05

Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

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

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: **MC510ME**
Credits :01	CIE Marks:30	Duration of SEE: 02 Hours

COURSE OBJECTIVE	**COURSE OUTCOMES**
	On completion of the course, students will be able to
formulate script files and plots using MATLAB and develop programs and solve differential equations.	1 utilise MATLAB for mathematical operations using built-in functions.
	2 formulate matrices for solution of equations using MATLAB.
	3 develop 2-D plots using MATLAB for graphical representation.
	4 develop programs using conditional statements.
	5 solve differential equations using MATLAB.

UNIT –I
Starting MATLAB, MATLAB Windows., Working in Command Windows, Working with Arithmetic operations with scalars, order of preference, using MATLAB as a calculator, Display of formats, Elementary Math-building functions, Assignment operators, rules about variables, Examples of MATLAB 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 in Mat lab, 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.

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

The break-up of CIE: Internal Tests + Assignments + Quizzes

| 1 | No. of Internal Tests (along with II int): | 1 | Max. Marks for the Internal Test: | 30 |

| 2 | No. of Assignments: | -- | Max. Marks for each Assignment: | -- |

| 3 | No. of Quizzes: | -- | Max. Marks for each Quiz Test: | -- |

Duration of Internal Test: **90 minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

FLUID MECHANICS AND HYDRAULIC MACHINES LAB
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:50	Course Code: **PC511ME**
Credits :01	CIE Marks:30	Duration of SEE: 02 Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*	
The objective 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.	1	determine the coefficient of impact on semi circular vane under constant jet velocity.
	2	evaluate the discharge coefficients of various flow measuring devices.
	3	evaluate the performance of impulse and reaction turbines at constant head.
	4	calculate the efficiency of dynamic and positive displacement pumps for various flow rates.

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.
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. Performance characteristics curves of a centrifugal pump at variable speed.

From the above experiments, each student should perform at least 12 (Twelve) experiments.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: **3 Hours**			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

CAD / CAM LAB
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:50	Course Code: **PC531ME**
Credits :01	CIE Marks:30	Duration of SEE: 02 Hours

COURSE OBJECTIVE	COURSE OUTCOMES *On completion of the course, students will be able to*	
The objective of this course is to practice 2D and 3D modeling, practice assembly of various components and understand how to write the CNC programming.	1	develop 3D part models.
	2	develop assembly of given components.
	3	develop CNC programming for the given simple turning and milling operations.
	4	expose to 3D manufacturing

I. CAD:
1. Practice in the use of some of the packages like: NX (SIEMENS) / CATIA etc., for geometric modeling of simple parts (sketching).

2. Part modeling simple parts using any of the above packages.

3. Developing Assemblies e.g,
   i. Flange coupling
   ii. Plummer block
   iii. Universal coupling
   iv. Connecting rod

II. CAM:
1. Write manual part programs for CNC lathe for operations:
   i) Plain turning.
   ii) Step turning.
   iii) Taper turning.

2. Write manual part programs for CNC milling for operations:
   i)   Linear interpolation.

ii) Circular interpolation.

iii) Contouring and pocketing.

3. Manufacture of a 3-D component using additive manufacturing.

From the above experiments, each student should perform at least 12 (Twelve) experiments.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment for day to day evaluation			18
Duration of Internal Test: **3 Hours**			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

MANUFACTURING PROCESSES LAB
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:50	Course Code: **PC541ME**
Credits :01	CIE Marks:30	Duration of SEE: 02 Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*	
The objective of the course is to manufacture components using various casting, welding and forming methods and to study their defects.	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 and theoretical estimation of 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.

From the above experiments, each student should perform at least 12 (Twelve) experiments.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment for day to day evaluation			18
Duration of Internal Test: **3 Hours**			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING

Course Code	Course Title	L	T	D/P	Duration in Hrs	SEE	CIE	Credits
B.E (MECH) VI Semester								
		Scheme of Instruction			**Scheme of Examination**			
		Hours per Week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	T	D/P		SEE	CIE	
THEORY								
HS010EH	Finishing School-IV : Soft Skills	1	-	-	2	40	30	1
PC610ME	Metal Cutting and Machine Tools	3	-	-	3	60	40	3
PC620ME	Dynamics of Machines	3	-	-	3	60	40	3
PC630ME	Heat Transfer	3	-	-	3	60	40	3
PC640ME	Metrology and Instrumentation	3	-	-	3	60	40	3
PE6XXME	Professional Elective-I	3	-	-	3	60	40	3
OE6XXXX	Open Elective – V	3	-	-	3	60	40	3
MC610ME	Finishing School-IV : Technical Skills	1	-	-	2	40	30	1
PRACTICALS								
PC611ME	Machine Tools Lab	-	-	2	3	50	30	1
PC621ME	Dynamics and Metrology Lab	-	-	2	3	50	30	1
PW619ME	Mini Project	-	-	2	-	-	50	1
TOTAL		**20**	**-**	**6**		**540**	**410**	**23**
GRAND TOTAL		**26**				**950**		**23**

1) Student should acquire one online certificate course during III semester to VIII semester
2) Left over hours allotted to Sports / Library / Proctorial Interaction / CC / RC / TC / CCA / ECA

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING

List of Professional Electives Stream wise (R-17)

	Design engineering		Manufacturing engineering		Thermal engineering		Industrial engineering		Automobile Engineering	
	Course Code	Title	Course Code	Title	Course Code	Title	Course Code	Title	Course Code	Title
VI-Semester										
PE-I	PE610ME	Vibration Analysis and Noise Control	PE620ME	Production Drawing	PE630ME	Renewable Energy	PE640ME	Operations Research	PE650ME	Automotive Chassis Components

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

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

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: HS010EH
Credits :01	CIE Marks:30	Duration of SEE:02 Hours

	COURSE OBJECTIVES	COURSE OUTCOMES		
		On completion of the course, students will be able to		
1	Students will be introduced to higher order thinking skills and problem solving on the following areas – Arithmetic ability, Numerical ability and General reasoning.	1	Solve questions on the above mentioned areas using short cuts and smart methods.	
		2	Understand the fundamentals concept of Aptitude skills.	
2	Students will be trained to work systematically with speed and accuracy while problem solving.	3	Perform calculations with speed and accuracy.	

UNIT-I: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED

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

UNIT-II: REASONING ABILITY- LOGICAL REASONING

- Arrangements- Linear; Circular; Complex
- Puzzles
- Venn diagrams
- Syllogism
- Cubes & Cuboids
- Dices

UNIT-III: REASONING ABILITY- NON VERBAL REASONING

- Figure Series
- Figure Completion
- Mirror Images
- Water Images
- Paper Cutting
- Paper Folding
- Embedded Images

UNIT-IV: REASONING ABILITY- CRITICAL REASONING PART 1

- Statement Assumptions
- Statement Arguments

UNIT 5 REASONING ABILITY- CRITICAL REASONING PART 2

- Course Of Action
- Cause & Effect
- Inferences

Learning Resources:

1. Scoremore.talentsprint.com

The break-up of CIE: Internal Tests + Assignments + Quizzes

| 1 | No. of Internal Tests: | 02 | Max. Marks for each Internal Test: | 20 |

| 2 | No. of Assignments: | 02 | Max. Marks for each Assignment: | 5 |

| 3 | No. of Quizzes: | 02 | Max. Marks for each Quiz Test: | 5 |

Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

METAL CUTTINGAND MACHINE TOOLS
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC610ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	On completion of the course, students will be able to
The objective of this course is to study the kinematic structure and constructional features of machine tools, surface finishing, tool design characteristics, metal cutting characteristics and tool characteristics.	1 classify different types of machine tools used in Industry and their constructional features.
	2 identify and use flat surface generating machines and able to perform gear cutting operations.
	3 understand the importance of surface finishing methods, work holding devices.
	4 compute forces in machining operations based on tool material and tool geometry and non conventional machining methods for various machining applications.
	5 interpret functioning of coolants in metal cutting and its thermal effect on tool wear 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, machining time calculations, tool and work holding devices.
Drilling: Types, operations and machining time calculations.

UNIT-II
Shaping, Planning and Slotting: Principle and quick return mechanisms used, operations and comparison, machining time calculations.
Milling Machine: Kinematic structure of Milling, Operations dividing head, Indexing Methods.

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 of jigs and fixtures, location and clamping. Quick clamping devices, Types of Jigs and Fixtures.

UNIT – IV
Non-traditional machining: working principleprocess parameters, applications and material removal rate of USM, AJM, EDM, ECM, LBM, and EBM.
Cutting tool materials: Tools material properties. High carbon steel, HSS, Stellites, Carbides, Coated carbides, Diamonds.
Machining: Orthogonal and Oblique cutting, chip formation, types of chips, chip breakers Mechanics of metal cutting, Merchant analysis, Shear angle, Solutions of Merchant and Lee & Shafer. Numerical problems.

UNIT-V
Tool geometry: Nomenclature of single point cutting tool by ASA and ORS systems and conversions. 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. Numerical problems on economics of machining.

Learning Resources:
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

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: | 02 | Max. Marks for each Internal Test: | 30 |

2   No. of Assignments: | 03 | Max. Marks for each Assignment: | 05 |

3   No. of Quizzes: | 03 | Max. Marks for each Quiz Test: | 05 |
    Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

DYNAMICS OF MACHINES
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC620ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES *On completion of the course, students will be able 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.	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: Four bar and slider crank mechanisms. Study of dynamically equivalent system, inertia forces on connecting rod.
Gyroscope: Gyroscopic couple, gyroscopic effects in vehicles.

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.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1 No. of Internal Tests: `02` Max. Marks for each Internal Test: `30`

2 No. of Assignments: `03` Max. Marks for each Assignment: `05`

3 No. of Quizzes: `03` Max. Marks for each Quiz Test: `05`
Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

HEAT TRANSFER
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC630ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES *On completion of the course, students will be able to*	
develop methodologies for solving a variety of practical engineering problems in conduction, convection and radiation heat transfer and their applications.	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: Cartesian (derivation), cylindrical and spherical coordinate systems. Steady state one dimensional heat conduction through slabs, hollow cylinders and spheres and problems, Concept of thermal resistance in series and parallel(composite systems), overall heat transfer coefficient, Critical radius of insulation: concept, derivation and numerical problems: (i) with and without internal heat generation and (ii) without variable thermal conductivity, Thermal contact resistance

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.

Transient (Unsteady state) heat conduction: definition, negligible internal thermal resistance, negligible surface resistance, comparable internal thermal and surface resistance – lumped body, 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 a plane surface. 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, Critical heat flux.
Condensation-Film condensation, Drop wise 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. Radiant heat exchange between infinite parallel plates and between

concentric cylinders, enclosures with black and gray surfaces. Radiation shields.

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

Learning Resources:
1. HolmanJ.P, "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. NecatiOzisikM, "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. Kothandaraman C. P, Subramanyan S, "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

The break-up of CIE: Internal Tests + Assignments + Quizzes

1 No. of Internal Tests: 02 Max. Marks for each Internal Test: 30

2 No. of Assignments: 03 Max. Marks for each Assignment: 05

3 No. of Quizzes: 03 Max. Marks for each Quiz Test: 05
Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

METROLOGY AND INSTRUMENTATION
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PC640ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES *On completion of the course, students will be able to*	
measurement of various mechanical features using metrology principles, instrumentation with sensors and transducers.	1	demonstrate the working of gauges and other devices used in measurement by following the principles of metrology.
	2	measuring component features considering physical and mathematical aspects on the basis of their application and limitations.
	3	learn instrumentation by classifying various Sensors and transducers based on the aspect of their sensitivity and working range.
	4	study 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, Allowances and types of Fits in an assembly- problems, Taylor's principle of plain limit gauges, Use of plug, Ring and Snap gauges. Design of Go Gauge and No Go gauge considering Gauge Tolerance and wear allowances- numerical problems.

Introduction– Linear and Angular measurements– Line and end standards, Slip Gauges – Types, Height gauges, Tomlinson gauges, Sine bar. Numerical problems on slip gauges, Angle gauges, sine bar and sensitivity of spirit level.

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 measurand, 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 Edition, Tata McGraw Hill, 2004.
2. Thomas G Beckwith, Roy D Marangoni, John H Lienhard V, "Mechanical Measurements", 6th Edition, Pearson Education Asia, 2007.
3. B.C. Nakra, K.K. Chaudhry, "Instrumentation Measurement and Analysis", 3rd Edition, McGraw Hill, 2014.
4. R.K. Jain, "Engineering Metrology", Khanna Publications, 1996.
5. I.C. Gupta – "A Text Book of Engineering Metrology",7th Edition,Dhanpat Rai Publications, New Delhi.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: | 02 | Max. Marks for each Internal Test: | 30 |

2   No. of Assignments: | 03 | Max. Marks for each Assignment: | 05 |

3   No. of Quizzes: | 03 | Max. Marks for each Quiz Test: | 05 |
   Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

VIBRATION ANALYSIS AND NOISE CONTROL (PE-I)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PE610ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
The objective of this course is to formulate mathematical model and determine the characteristics of multi DOF and continuous system vibration; demonstrate the basics of sound in space, classify noise measuring devices and noise control procedures	1 construct the equations of motion and solve for the motion and natural frequency.
	2 solve for the motion and the natural frequency for vibration of a multi degree of freedom damped or undamped system.
	3 develop the equation of motion for continuous systems and find the natural frequencies and mode shapes based on the given boundary conditions.
	4 explain various characteristics of sound, it's propagation and levels in space and compute the acoustic properties at a required point in space.
	5 understand working principle of various noise measurement devices and noise control procedures to avoid the damage caused by Noise on humans.

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 Wave propagation, 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. S.S.Rao, "Mechanical Vibrations ", 5th Edition, Prentice Hall, 2011.
2. L.Meirovitch, "Elements of vibration Analysis", 2nd Edition, McGraw-Hill, New York, 1985.
3. W.T. Thomson, M.D. Dahleh and C Padmanabhan, "Theory of Vibration with Applications", 5th Edition,Pearson Education, 2008.
4. M.L.Munjal, "Noise and Vibration Control", World Scientific, 2013.
5. Beranek and Ver, "Noise and Vibration Control Engineering: Principles and Applications", John Wiley and Sons, 2006.
6. Randall F. Barron, "IndustrialNoise Controland Acoustics",Marcel Dekker, Inc., 2003.

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

The break-up of CIE: Internal Tests + Assignments + Quizzes

1 No. of Internal Tests: 02 Max. Marks for each Internal Test: 30

2 No. of Assignments: 03 Max. Marks for each Assignment: 05

3 No. of Quizzes: 03 Max. Marks for each Quiz Test: 05
Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

PRODUCTION DRAWING (PE-I)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PE620ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	On completion of the course, students will be able to
practice the conventional representation of machine elements; limits, fits and tolerances; surface finish and surface treatments; make production drawings and process sheets for a given assembly.	1 Familiar with conventional representation.
	2 understand the use of limits fits and surface finish symbols.
	3 prepare production drawings and process sheets.

UNIT-I: INTRODUCTION
Need for a production drawing, Drawing sheet layout, title block, conventional representation of materials, machine components, welding symbols, hydraulic and pneumatic symbols, draughting abbreviations and surface treatment symbols.

UNIT-II: LIMITS, TOLERANCES AND FITS
Limit systems, Tolerances, Fits, Tolerances of form and position, and their indication on a drawing, material condition(MMC and LMC), Geometrical tolerancing for MMC.

UNIT-III: SURFACE ROUGHNESS
Surface Roughness, surface roughness number, surface roughness expected from manufacturing processes, indication of surface roughness, special surface roughness characteristics, direction of lay.

UNIT-IV: PROCESS SHEET
Process sheet, its details and uses, process sheet for various machine components like tenon, bearing brass, slip bush, helical gear, flange, main spindle etc.

UNIT-V: PRODUCTION DRAWING
Production drawings from assembly drawings indicating conventions of flange coupling, Universal coupling, foot-step bearing, eccentric, stuffing box, hydraulic cylinder, petrol engine connecting rod, cross head, piston and screw jack.

N.B.: Tolerance charts to be provided in the examination hall for calculation of limits.

Learning Resources:

1. K.L. Narayana, P. Kannaiah and K. Venkata Reddy, "Production Drawing", New Age International Pvt. Ltd., Revised Ed. 1997.
2. T. Narasimha Reddy, T. A. Janardhan Reddy and C. Srinivasa Rao, "Production Drawing Practice", Hitech Publishers, 2001.
3. R.K. Jain, "Engineering Metrology", Khanna Publishers, 2009.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: 02   Max. Marks for each Internal Test: 30

2   No. of Assignments: 03   Max. Marks for each Assignment: 05

3   No. of Quizzes: 03   Max. Marks for each Quiz Test: 05
    Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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Department of Mechanical Engineering

RENEWABLE ENERGY (PE-I)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PE630ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES	
	On completion of the course, students will be able to	
study the availability and applications of various renewable energy systems like solar energy, photovoltaic energy, wind energy, geothermal energy, ocean thermal energy, tidal and wave energy, fuel cell energy and biomass energy.	1	use the knowledge of solar energy conversion techniques and calculate conversion efficiency
	2	design wind and geothermal energy systems that are economically feasible and eco-friendly.
	3	understand working of ocean thermal, tidal and wave energy power plants.
	4	understand major components of various fuel-cells.
	5	understand major components of bio-mass energy conversion systems.

UNIT I
Solar Energy: Availability of solar energy, Measurement of sunshine, solar radiation data, estimation of average solar radiation, solar energy selection, selective surfaces, construction of solar flat plate and evacuated tube collectors, solar heating and cooling; other solar thermal applications.
Photo-voltaic Energy: Solar cells – Photo-voltaic conversion efficiency, performance characteristics of solar cells as a function of light intensity, temperature and cell area, Solar cell response under normal condition, solar cell arrays.

UNIT II
Wind Energy: Wind mills and wind turbine systems; classification of wind machines: horizontal & vertical axis configuration; High and low solidity rotors, elements of wind mills and wind turbine systems; Aerodynamic models, Rankine Froud Actuator disc model.
Geo-thermal Energy: Earth as source of heat energy, stored heat and renewability of earth's heat; Nature and occurrence of geo-thermal field;

Classification of thermal fields; Model of Hyper-thermal fields & Semi-thermal fields.

UNIT III
Ocean Thermal Energy: Ocean thermal energy sources, Ocean thermal energy power plant development; Closed and open cycles: advantages and operating difficulties.
Tidal & Wave Energy: Tidal power sources; conventional and latest design of tidal power system, the ocean wave, oscillating water column (Japanese) and the Dam.

UNIT IV
Fuel Cell Energy: Description, properties and operation of fuel cells; major components & general characteristics of fuel cells; description of low power fuel cell systems and molten carbonate fuel cell systems.

UNIT V
Bio-mass Energy: Types of conversion techniques for the production of solid, liquid and gaseous fuels by chemical and bio-chemical methods - Bio-gastechnology, principles and feed stock, design of bio-gas plants.

Learning Resources:
1. Twidell J.W. & Weir A., "Renewable Energy Sources", 2nd Edition, EFN Spon Ltd., UK, 1986.
2. G.D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, New Delhi, 2009.
3. S.P. Sukhatme, "Solar Energy", 3rd Edition, Tata McGraw Hill Pub. Co. Ltd., 2008.
4. Johnson Gary L., "Wind Energy Systems", 2nd Edition, Prentice Hall, New York, 1995.
5. Hall D.D. & Grover R.P., "Biomass Regenerable Energy", 1st Edition, John Wiley, 1989.
6. Leemann&Meliss, "Renewable Energy Sources & Conversion Technology", 4th edition, TMH, 1993.
7. S.Hasan Saeed,D.K.Sharma, "Non –conventional energy Resources", 3rd Edition, S.K.Kataria& Sons, 2012.

Web Resources:
1. www.renewable-energy-sources.com/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1 No. of Internal Tests: ☐ 02 ☐ Max. Marks for each Internal Test: ☐ 30 ☐

2 No. of Assignments: ☐ 03 ☐ Max. Marks for each Assignment: ☐ 05 ☐

3 No. of Quizzes: ☐ 03 ☐ Max. Marks for each Quiz Test: ☐ 05 ☐
Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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Department of Mechanical Engineering

OPERATIONS RESEARCH (PE-I)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PE640ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	On completion of the course, students will be able to
The objective of the course is to understand the application of mathematics for real time problem solving to LPP, sensitivity analysis under set of constraints, applying mathematical techniques to solve transportation problem and assignment problems, applying time value money and ignoring the same to find the optimal replacement of machines, applying Johnsons rules to find the best sequence to minimize elapsed time and minimum no of servers to minimize waiting time of the customers and optimal utilisation of servers.	1 Optimization of resources in multi disciplinary areas through linear programming under different conditions.
	2 Sensitivity analysis of a linear programming problem as per customer requirements to suit various Organizations.
	3 Minimization of total cost to apply for transportation techniques for the transshipment of Goods and products.
	4 Optimum replacement of a machine by considering or ignoring time value of moneyusing individual/group replacement policy.
	5 Minimization of total elapsed time for sequencing problem processed through different. Minimize waiting time of the customer and optimization of no. of servers.

UNIT – I
Introduction: Definition and scope of operations research.
Linear programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, Simplex method, maximization and minimization, degeneracy in LPP, unbounded and infeasible solutions. Introduction of software to solve LPP.

UNIT – II
Duality: Definition, Relationship between optimal primal and dual solutions. Economic interpretation, Post optimal analysis (restricted to variation of resources i.e., RHS), Dual simplex method.

UNIT-III
Transportation model: Finding an initial feasible solution– north west corner method, least cost method, Vogel's approximation method, finding the optimal solution, optimal solution by stepping stone and MODI methods, special cases in transportation problems – Unbalanced transportation problem.
Assignment Problem: Hungarian method of assignment problem, maximization in assignment problem, unbalanced problem, problems with restrictions, travelling salesman problems.

UNIT-IV
Replacement models: Introduction, replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – individual replacement policy, group replacement policy.
Game theory: Introduction, 2 person zero sum games, maximin– minimax principle, principle of dominance, solution for mixed strategy problems graphical method for 2 x n and m x 2 games.

UNIT-V
Sequencing models: Introduction, general assumptions, processing n jobs through 2 machines, processing 'n' jobs through m machines processing 2 jobs through m machines.
Queuing theory: Introduction, single channel – poission arrivals – exponential service times with infinite population and finite population.

Learning Resources:

1. Hamady A. Taha, "Operations Research – An introduction", 6th Edition, PHI Pvt. Ltd., 1997.
2. S.D. Sharma, "Operations Research", Kedarnnath, Ramnath& Co., Meerut, 2009.
3. Harvey M. Wagner, "Principles of Operations Research", 2nd Edition, PHI Pvt. Ltd., 1980.
4. V.K. Kapoor, "Operations Research", S. Chand Publishers, New Delhi, 2004.
5. S.S. Rao, "Engineering optimisation – Theory and Practice", 4th Edition, John Wiley & Sons Inc., 2009 .

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: | 02 | Max. Marks for each Internal Test: | 30 |

2   No. of Assignments: | 03 | Max. Marks for each Assignment: | 05 |

3   No. of Quizzes: | 03 | Max. Marks for each Quiz Test: | 05 |
    Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

AUTOMOTIVE CHASSIS COMPONENTS (PE-I)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **PE650ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES	
	On completion of the course, students will be able to	
The objective of this course is to study the various components of the power transmission system of an automobile	1	describe the chassis layouts and their construction.
	2	describe the engine front axle and steering system.
	3	study various power drives for power transmission.
	4	analyse the working principle and operation of differential and rear axle.
	5	know the details of suspension system of an automobile.

UNIT-I : INTRODUCTION
Types of chassis layout with reference to power plant locations and drives, vehicle frames, various types of frames, constructional details, materials, testing of vehicle frames, unitized frame body construction.

UNIT-II : FRONT AXLE AND STEERING SYSTEM
Types of front axles, construction details, materials, front wheel geometry: castor, camber, king pin inclination, toe-in. conditions for true rolling motion of wheels during steering, steering geometry, Davis steering system and Ackermann, constructional details of steering linkages, different types of steering gear boxes, steering linkages and layouts, turning radius, wheel wobble, power assisted steering, steering of crawler tractors.

UNIT-III: DRIVE LINE
Effect of driving thrust and torque reactions, Hotchkiss drive, torque tube drive and radius rods, propeller shaft, universal joints, front wheel drive, different types of final drive, double reduction and twin speed final drives.

UNIT-IV
Differential principle, construction details of differential unit, non-slip differential, differential locks, differential housings, construction of rear axles, types of loads acting on rear axles, fully floating, three quarter floating and semi floating rear axles, rear axle housing, construction of different types of axle housings, multi axle vehicles.

UNIT-V: SUSPENSION SYSTEM
Need of suspension system, types of suspension, suspension springs, constructional details and characteristics of leaf, coil and torsion bar springs, independent suspension, rubber suspension, pneumatic suspension, shock absorbers.

Learning Resources:

1. Crouse & Anglin, "Automobile Engineering", 10th Edition,Tata McGraw Hill Publishing Co. Ltd., New Delhi,. 2007.
2. Kirpal Singh, "Automobile Engineering",Vol.I&II, 13th Edition,Standard Publishers,New Delhi 2013.
3. R.B Gupta, "Automobile Engineering" 7th Edition,Satya Prakashan,New Delhi, 2015.
4. Joseph Heitner, "Automotive Mechanics", 2nd Edition, Affiliated East West Pvt. Ltd.2013.
5. C.P. Nakra, "Basic Automobile Engineering", 7th Edition, Dhanpat Rai Publishing C (P) Ltd.,2016

The break-up of CIE: Internal Tests + Assignments + Quizzes

1   No. of Internal Tests: | 02 | Max. Marks for each Internal Test: | 30 |

2   No. of Assignments: | 03 | Max. Marks for each Assignment: | 05 |

3   No. of Quizzes: | 03 | Max. Marks for each Quiz Test: | 05 |
    Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

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

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: **MC610ME**
Credits :01	CIE Marks:30	Duration of SEE:02Hours

COURSE OBJECTIVES	COURSE OUTCOMES	
	On completion of the course, students 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
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.)
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
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.)
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
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.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests (along with II int):	01	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	--	Max. Marks for each Assignment:	--
3	No. of Quizzes:	--	Max. Marks for each Quiz Test:	--

Duration of Internal Test: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

MACHINE TOOLS LAB
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: **PC611ME**
Credits :01	CIE Marks:30	Duration of SEE: 03Hours

COURSE OBJECTIVES	COURSE OUTCOMES	
	On completion of the course, students will be able to	
familiarise the student with various machine tools and machining operations, analyse the machining process.	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, 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.

From the above experiments, each student should perform at least 12 (Twelve) experiments.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment for day to day evaluation			18
Duration of Internal Test: **3 Hours**			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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Department of Mechanical Engineering

DYNAMICS AND METROLOGY LAB
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: **PC621ME**
Credits :01	CIE Marks:30	Duration of SEE: 03Hours

	COURSE OBJECTIVES		COURSE OUTCOMES *On completion of the course, students will be able to*
1	understand the dynamic behaviour of mechanical systems like governors, cams, gyroscope, rotating machines and spring-mass systems;	1	analyze the cam profile for different motion characteristics.
		2	determine the vibration response of free and forced vibrating systems.
2	apply principles of metrology in the measurement using various instruments and transducers.	3	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.
		4	compare the performance of various thermocouples for temperature measurement and also learn about calibration of displacement transducer.

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 To conduct linear, angular & surface roughness measurements.
2 To conduct angular measurements.
3 To perform the design of snap gauge.
4 To find the 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 To make alignment test on lathe machine.

From the above experiments, each student should perform at least 12
(Twelve) experiments.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment for day to day evaluation			18
Duration of Internal Test: **3 Hours**			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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Department of Mechanical Engineering

MINI PROJECT
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:--	Course Code: **PW619ME**
Credits :01	CIE Marks:50	Duration of SEE: -----

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*	
The objective of this course is to enable the student to take up investigative study in the field of mechanical engineering.	1	choose appropriate field of interest and define the problem.
	2	Plan the activities for carrying out the work in teams to solve the problem.
	3	develop the capability to conduct investigations on the chosen problem and obtain results.

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.

No. of Internal Tests:	-	Max. Marks for Internal Test:	-
Marks for assessment of Mini Project			50
Duration of Internal Test: **---**			