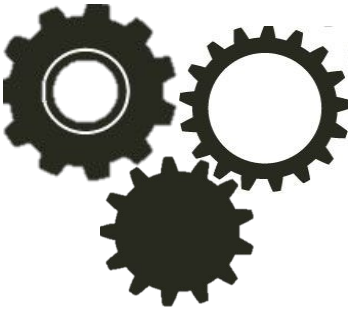
VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
Ibrahimbagh, Hyderabad-31

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
(R-19)
WITH EFFECT FROM 2021-22
(For the students admitted in 2019-20)



DEPARTMENT OF MECHANICAL ENGINEERING

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-19)
B.E. – MECH : FIFTH SEMESTER (2021-2022)

B.E (MECH) V Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
U19PC510ME	Heat Transfer	3	-	-	3	60	40	3
U19PC520ME	Metrology and Instrumentation	3	-	-	3	60	40	3
U19PC530ME	Dynamics of Machines	3	-	-	3	60	40	3
U19PC540ME	Manufacturing Processes	3	-	-	3	60	40	3
U19PC550ME	Design of Machine Elements	3	-	-	3	60	40	3
U19OE5XXXX	Open Elective - III	3	-	-	3	60	40	3
U19BS510MA	Skill Development Course III - Aptitude	1	-	-	2	40	30	1
U19HS010EH	Human Values and Professional Ethics-II	1	-	-	2	40	30	1
U19PE510ME	Skill Development Course III - Technical Skills	1	-	-	2	40	30	1
PRACTICALS								
U19PC531ME	Dynamics and Metrology Lab	-	-	2	3	50	30	1
U19PC541ME	Manufacturing Processes Lab	-	-	2	3	50	30	1
U19PW519ME	Programming for Mechanical Engineering Lab	-	-	2	-	0	30	1
TOTAL		**21**	**0**	**6**		**580**	**420**	**24**
GRAND TOTAL		**27**				**1000**		**24**

1) Student should acquire one online course certificate equivalent to two credits during III to VII semester
2) Left over hours allotted to Sports / Library / Mentor Interaction / CC / RC / TC / CCA / ECA

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

HEAT TRANSFER

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week): 3:0:0	SEE Marks:60	Course Code: **U19PC510ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE *The objective of this course is to*	**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 systems by transforming the physical system into a mathematical model. 2 understand augmentation of heat transfer by the provision of fins and predict time-dependent heat transfer in solids for engineering applications. 3 interpret convective heat transfer coefficients in free and forced convection for internal and external flows. 4 design the heat exchangers using the LMTD and ε-NTU approaches for industrial applications and distinguish the mechanisms involved in boiling and condensation. 5 estimate radiation heat transfer between black and non-black bodies using the laws of radiation.

UNIT-I: INTRODUCTION

Heat Transfer – Definition and Applications; Different modes of Heat Transfer, Governing Laws, General heat conduction equation in cartesian coordinates [derivation], cylindrical and spherical coordinates Steady-state one-dimensional heat conduction through slabs, cylinders and spheres without and with internal heat generation; Composite structures, Overall heat transfer coefficient, Thermal contact resistance, Critical insulation thickness.

UNIT-II: FINS AND TRANSIENT CONDUCTION

Fins: definition, classification and applications, analysis of fin - rectangular and circular fins, temperature distribution and heat transfer rate calculations, fin efficiency and effectiveness.

Transient 1-D heat conduction: lumped system, use of Heisler and Grober charts for infinite slabs, cylinders and spheres.

UNIT-III: CONVECTION

Forced Convection: Velocity and thermal boundary layers over an isothermal flat plate; analytical and empirical correlations: flow over flat plates, cylinders and spheres, internal flow through tubes of circular and non-circular cross-section.

Free Convection: Velocity and thermal boundary layers over an isothermal vertical flat plate; empirical correlations for flow past plates, cylinders and spheres.

Dimensional analysis, Buckingham π - theorem and its applications to forced and free convection.

UNIT-IV: HEAT EXCHANGERS AND PHASE-CHANGE HEAT TRANSFER

Heat Exchangers: Definition, classification and applications of heat exchangers; overall heat transfer coefficient; Effects of fouling; design and analysis of parallel, counter and cross-flow heat exchangers using LMTD and Effectiveness-NTU methods.

Phase-change Heat Transfer: Boiling - definition, types, pool boiling curve, empirical relation for critical heat flux; Condensation - definition, types, film-wise, drop-wise condensation, Empirical relations for film wise condensation.

UNIT-V: THERMAL RADIATION

Fundamental principles – Gray, White, Opaque, Transparent and Black bodies, Spectral emissive power, Wien's, Rayleigh-Jeans and Max Planck's laws, Hemispherical emissive power, Stefan-Boltzmann law for total emissive power of a black body, Emissivity and Kirchhoff's laws, Radiation view (shape) factor, View factor algebra, Total emissive power, Radiation heat exchange between infinite parallel plates, concentric cylinders, spheres - chart solutions; Radiation shields.

Note: Use of heat transfer data book permitted.

Learning Resources:

1. Holman J.P, "Heat transfer", Tata McGraw Hill Publication, New Delhi, 2010. 10th edition
2. Incropera, F.P. and De Witt D.P.- "Fundamentals of Heat and Mass Transfer", John Wiley and sons, New York, 2008.
3. Sachadeva R.C., "Fundamentals of Engineering Heat and Mass Transfer", New Age International (P) Ltd Publishers, New Delhi, 2010.
4. Rajput R.K., "Heat and Mass Transfer", S. Chand & Company Ltd., New Delhi, 2004.
5. Necati Ozisik M, "Heat transfer – A basic approach", McGraw-Hill, New York, 2005.

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.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19PC520ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objective of this course is	*On completion of the course, students will be able to*
measurement of various mechanical features using metrology principles, instrumentation systems with sensors and transducers which measure Temperature, Force, Torque, Strain, displacement & acceleration.	1 Identify the Principles of measurement , study of Various types of Limit s, Fits & tolerances and demonstrate the working Principle of Limit 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 & Analyse instrumentation Principles by classifying various Sensors and transducers based on the study of their static & dynamic characteristics aspect of their sensitivity , working range and applications. 4 Study of strain gauges, Load cells and dynamometers for the measurement of strain, Force & Torque by estimating their performance during working conditions. 5 Identify the seismic transducers for the measurement of displacement, acceleration, & study of various pressure measuring Instruments 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, measurement of angle with 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 Nomenclature & Gear tooth thickness using chordal tooth thickness method, General Geometric tests for testing machine tools – Lathe, drilling and milling machines.

UNIT-III: **ELEMENTS OF INSTRUMENTATION SYSTEM**

Concept of measurement measure and, 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.
6. D. S. Kumar- "Mechanical Measurements & control" S. Chand Publications

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

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

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

DYNAMICS OF MACHINES

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19PC530ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES *The objective of this course is to*	**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 effect of forces in Four bar and slidercrank mechanisms using equilibrium conditions, calculate the gyroscopic couple and interpret its effect in aeroplane, ship and automobile vehicle. 2 balancing of reciprocating and rotating machinery by addition or removal of masses by eliminating/reducing inertia forces. 3 calculate frictional torque and power due to friction in screw threads, bearings, clutches, brakes and dynamo meters. 4 estimate the operational characteristics in Governors, understand the Flywheel sizes required for I.C engines and Presses. 5 Estimate the vibration characteristics of single degree of freedom free, damped and forced vibration systems.

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 aeroplane, ship and automobile vehicle.

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: Power screw.

Thrust bearings-pivots and collars.

clutches-single plate, cone and centrifugal clutches.

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

UNIT-IV

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

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

UNIT-V:

Introduction to Mechanical Vibrations: Basic concepts of simple Harmonic motion. Single degree of freedom Axial-Free,Dampedand Forced Vibrations, Magnification factor, Vibration Isolation and Transmissibilty.Transverse-Free vibrations, Whirling speed.Torsional-Free vibrations.

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.

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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: **U19PC540ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able 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 and solidification 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. Engineering stress and strain, true stress and strain

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

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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

DESIGN OF MACHINE ELEMENTS

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks : 60	Course Code: U19PC550ME
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hours

Course objectives	Course Out comes
The objectives of this course are to : analyse the failure of components due to static and fluctuating loads, design of shafts, joints, fasteners, riveted and welded joints.	On completion of the course the student will be able to: 1. estimate the size of machine component based on theories of failure for component subjected to different types of loads. 2. estimate the size/life of machine components subjected to fluctuating (Fatigue) loads based on Goodman and Soderberg criteria/ S-N diagram 3. determine the size of shafts & fasteners subjected to torsion, bending, axial load or a combination of these to prevent failure. 4. analyze the Joints and couplings for a given load to prevent failure. 5. design of Power screws, riveted joints and welded joints for a given load under direct and eccentric loads.

UNIT-I

Design considerations of Machine Elements: Materials used in machine design and their specifications according to Indian Standards. Preferred numbers. Review of types of loads and simple stresses. Design of cotter and knuckle joints. Stresses due to Bi-axial. Factor of safety. Theories of failures. Design of components subjected to impact loading.

UNIT-II

Design for Fatigue: Fluctuating stresses, fatigue strength and endurance limit Stress concentration factor and Notch sensitivity. Factors affecting fatigue strength. S-N diagram, Soderberg and Modified Goodman's diagrams for fatigue design. Cumulative fatigue - Miner's rule.

UNIT-III

Design of shafts: solid, hollow and splined shafts under torsion and bending loads. ASME code for design of shafts. Design of keys. Design of couplings - Muff, Flange, Flexible. Design of pulleys.

UNIT-IV

Design of Bolts and nuts, locking devices for nuts, bolts of uniform strength, bolted joints under eccentric loads.

UNIT-V

Design of Screws: Design of power Screws and screw jack. Differential and Compound Screws.

Design of riveted and welded joints under direct and eccentric loads.

Learning Resources:

1. M.F. Spotts, *"Design of Machine Elements"*, 7th Ed., Pearson Education, 2003.
2. V. B. Bhandari, *"Design of Machine Elements",* 3rd Ed., Tata McGraw- Hill, 2010.
3. P.C. Sharma & D.K. Aggarwal, *"Machine Design",* 10th Ed., S.K. Kataria& Sons, 2003.
4. J.E. Shigley& Charles R. Mischke "*Mechanical Engineering Design",* 6th Ed., Tata McGraw-Hill, 2010.
5. N.C. Pandya and C.S. Shah, *"Machine Design"* ,Charotar publishing House, 2006.

Web Resources:

http://nptel.ac.in/courses/112105124

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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**

B.E- V SEM OPEN ELECTIVE-III COURSES			
Dept.	**Title**	**Code**	**Credits**
CSE	Principles of Data Structures	U19OE510CS	3
MECH	Introduction to Robotics	U19OE510ME	3
MECH	Introduction to Automobile Engineering	U19OE520ME	3

VASAVICOLLEGE OFENGINEERING (Autonomous)
IBRAHIMBAGH,HYDERABAD – 500 031

DEPARTMENTOFCOMPUTER SCIENCE AND ENGINEERING

PRINCIPLES OF DATA STRUCTURES (OPENELECTIVE-III)
SYLLABUS FORB.E.V SEMESTER

L:T:P(Hrs./week):3	SEEMarks:60	CourseCode:U19OE510CS
Credits:3	CIE Marks :40	Duration of SEE: 3 Hrs

COURSEOBJECTIVES	COURSEOUTCOM
Objectives of this course are to:	At the end of the course ,students
1.Understand Basic linear and non-linear data structures and learn techniques of recursion 2. Understand concepts of Linked lists 3. Understand Concepts of Stacks and queues 4. Understand Concepts of Trees 5. Understand Concepts of Graphs and different sorting and searching techniques and their	1. Understand the basic concepts of data structures. 2. Understand the notations used to analyze The performance of algorithms. 3. Choose and apply an appropriate data structure for a specified application. 4. Understand the concepts of

Unit-I

Introduction: Data Types, Data structures, Types of Data Structures, Operations, ADTs, Algorithms, Comparison of Algorithms, Complexity, Time- space tradeoff.

Recursion: Introduction, format of recursive functions, recursion Vs. Iteration, examples.

Unit-II

LinkedLists: Introduction,Linkedlistsandtypes,Representationoflinked list, operations on linked list, Comparison of Linked Lists with Arrays and Dynamic Arrays.

Unit-III

Stacks and Queues: Introduction to stacks, applications of stacks, implementation, and comparison of stack implementations. Introduction to queues, applications of queues and implementations, Priority Queues and applications.

Unit-IV

Trees: Definitions and Concepts, Operations on Binary Trees, Representation of binary tree, Conversion of General Trees to Binary Trees, Representations of Trees, Tree Traversals, Binary search Tree.

Unit-V

Searching and Sorting: Linear searching, binary Searching, sorting algorithms: bubble sort, selection sort, quick sort, mergesort.

Learning Resources:

1. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", CareerMonkPublications,2017.
2. Horowitz E, SahniS., and Susan Anderson- Freed, "Fundamentals of Data structuresin C", SiliconPr;2 edition(1August2007).
3. KushwahaD.S.andMisraA.K,"DatastructuresAProgrammingApproachwithC", PHI.
4. SeymourLipschutz,"DataStructureswithC",McGrawHillEducation,2017.

Web resources:

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. https://www.edx.org/course/foundations-of-data-structures
3. https://sites.google.com/site/merasemester/data-structures

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

SYLLABUS FOR B.E. V-SEMESTER

INTRODUCTION TO ROBOTICS (Open Elective-III)

L:T:P(Hrs./week):3	SEE Marks : 60	Course Code: U19OE510ME
Credits : 3	CIE Marks: : 40	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. understand the anatomy of the robot and various robot configurations for it's selection depending on the task. 2. classify the end effectors , understand different types of joints, various types of robot drive systems for carrying out the assigned job effectively. 3. analyze a planar manipulator through forward kinematics and understand the control of robot manipulator for better reliability and efficiency using python programming. 4. Classify the various sensors used in robots for proper selection to an application. 5. summarize various industrial and non-industrial applications of robots for their selection to a particular task.

UNIT-I

ROBOT BASICS

Robot-Basic concepts, Definition, Need, Law, History, Anatomy, specifications.

Robot configurations-cartesian, cylindrical, polar ,articulated and SCARA, Serial manipulator &Parallel Manipulator

Robot wrist mechanism, Precision and accuracy of robot.

UNIT-II

ROBOT ELEMENTS

End effectors-Classification, Robot drive system types: Electrical, pneumatic and hydraulic. Robot joints and links-Types, Motion interpolation, Robot trajectories2D and 3D Transformation- Scaling, Rotation and Translation, Homogeneous transformation

UNIT-III
ROBOT KINEMATICS AND CONTROL

Robot kinematics – Basics of direct and inverse kinematics. D-H matrix. Forward kinematics for a 2-link RR planar manipulator.
Control of robot manipulators – Point to point and Continuous Path Control. Robot programming methods. Introduction to Solve any robotic kinematic problem using python programming.

UNIT-IV
ROBOT SENSORS

Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors, Light sensors, Pressure sensors, position and velocity feedback devices.
Introduction to Machine Vision and Artificial Intelligence.

UNIT-V
ROBOT APPLICATIONS

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

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel and Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", TataMcGraw-Hill Publishing Company Limited , 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.
3. KlafterR.D, Chmielewski T.A, and Negin. M, "Robotic Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd.,1994.
4. K.S. Fu,R.C. Gonzalez and C.S.G.Lee , "Robotics control, sensing, vision and intelligence",TataMcGraw-Hill Publishing Company Limited, 2008
5. R.K. Mittal and I.J.Nagrath "Robotics and Control", Tata McGraw-Hill Publishing Company Limited, 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
SYLLABUS FOR B.E. V-SEMESTER
INTRODUCTION TO AUTOMOBILE ENGINEERING (OE-III)

Instruction : 3Hours	SEE Marks : 60	Course Code : U19OE520ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. familiarize the student with the different types of automobiles and engine components along with its working. 2. impart adequate knowledge in fuel supply, cooling, lubrication and ignition of IC engines. 3. understand the steering geometry, steering mechanism and types of suspension systems. 4. gain the knowledge about working of clutch, gear mechanism, brakes 5. make the student conversant with types of wheels, tyres and pollution control techniques.	On completion of the course, the student will be able to: 1. identify types of Automobiles and engine components and describe its working. 2. describe the engine fuel system in petrol and Diesel engines, cooling, lubrication systems. 3. describe the steering mechanism, suspension systems 4. describe the working principle and operation of clutch, gear mechanism and brakes. 5. know the pollutants from automobile and pollution control techniques and identify the types of wheels, tyres.

UNIT-I

Introduction: Types of automobiles: Hybrid Vehicles, Electrical, gas and Fuel cell vehicles. Chassis and body, Lay out of transmission system, Engine components: cylinder block, cylinder head, crankcase,

crank shaft and cam shaft. Types and working of IC Engines: SI and CI engines, two stroke and four stroke engines.

UNIT-II

Fuel system: Fuel supply system for SI engines and CI engines. Simple carburettor, Introduction to Multipoint fuel injection system (**MPFI**) of petrol engines, Introduction to **CRDI** system for diesel engines.

Cooling system: air cooling, water cooling: Thermo syphon, pump circulation system.

Lubrication system: Petroil System, splash system, pressure lubrication: Wet sump and Dry Sump.

Ignition system: Battery Ignition System, Magneto Ignition System and Electronic Ignition System.

UNIT-III

Suspension system: Rigid axle, Independent suspension system: Double wish bone type, Macpherson strut system, Air suspension system.

Steering system: wheel alignment, Ackermann steering mechanism, steering geometry: camber, caster, toe-in, toe-out, steering linkage for vehicle with rigid axle front suspension, steering linkage for vehicle with independent front suspension.

UNIT –IV

Power Train: Single plate clutch, Multi plate clutch. Manual Gear Box: sliding mesh gear box, constant mesh gear box, synchromesh gear box and Automatic Gear Box. Working principle of Differential.

Brakes: Types: Drum and Disc brakes, Mechanical and Hydraulic Brakes, **ABS** system.

UNIT –V

Wheels and Tyres: Types of Wheels: wire wheels, disc wheels, alloy wheels. Types of tyres: Tube type, tubeless type.

Automobile Emissions and control: Automobile pollutants and sources of pollution. Pollution Control Techniques: Catalytic Converters, EGR and PCV. Bharath emission Norms.

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 MATHEMATICS

SKILL DEVELOPMENT COURSE III - APTITUDE
SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks : 40	Course Code: U19BS510MA
Credits : 1	CIE Marks : 30	Duration of SEE: 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
APTITUDE	**APTITUDE**
This is a foundation course and aims at enhancing employability skills in students	Do well in employability exams
Introduce higher order thinking skills and problem solving on the following areas - Arithmetic Ability, Numerical Ability and General Reasoning	Solve questions in the mentioned areas using shortcuts and smart methods.
Students will be trained to work systematically with speed and accuracy while problem solving	Understand the fundamentals concept of Aptitude skills and perform calculations fast and accurately

UNIT 1: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED 8 hrs

- Time speed and distance
- Boats and Streams
- Problems on trains

UNIT 2: REASONING ABILITY- LOGICAL REASONING 6hrs

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

UNIT 3: REASONING ABILITY- NON VERBAL REASONING 4hrs

- Figure Series

- Directions
- Clocks
- Calendars

UNIT 4: QUANTITATIVE APTITUDE - 2hrs

- Mensuration Part -1
- Mensuration Part -2
- Logarithms

UNIT 5: QUANTITATIVE APTITUDE 4hrs

- Permutations and combinations
- Probability

METHODOLOGY	**ASSESSMENTS**
- Demonstration	- Online assignments
- Presentations	- Individual and Group
- Expert lectures	
- Writing and Audio-visual lessons	

Learning Resources:
learn.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:	01	Max. Marks for each Assignment:	05
3	No. of Quizzes:	01	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 & 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: U19HS010EH
Credits: 1	CIE Marks : 30	Duration of SEE : Hours : 02

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to :-	At the end of this course, the student will be able to
1. Create an awareness on the interrelation between Society, Ethics and Human Values	1. Identify ethical risks in everyday life and in societies that can lead to unethical choices, such as structures that diffuse responsibility or a group that has collectively de-stigmatized unethical behaviour
2. Understand how ethical dilemmas apply to real life scenarios	2. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, and the objective presentation of data.
3. Develop ethical human conduct and professional competence.	3. Assess their own ethical values and the social context of problems and articulate what makes a particular course of action ethically defensible
4. Understand the role of good ethical practices and apply it in a project	4. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

UNIT-1 NORMATIVE ETHICS & SOCIETAL ETHICS

This unit deals with normative ethics, the branch of moral philosophy, or ethics, concerned with criteria of what is morally right and wrong. It includes the formulation of moral rules that have direct implications for what human actions, institutions, and ways of life should be like. This unit also covers societal ethics which is the systematic reflection on the moral dimensions of social structures, systems, issues, and communities.

UNIT 2 - PROFESSIONAL ETHICS - NEED FOR ETHICAL CODES

This unit covers the code of Professional Ethics- it is designed to ensure that students learn the necessary skills that groom them to behave like employees should, one that is socially acceptable and respectful of one another. It establishes the rules for behavior and sends a message to every employee that universal compliance is expected.

UNIT- 3 - PRIVACY

This unit covers "Cyber ethics" - the code of responsible behavior on the Internet. Just as we are taught to act responsibly in everyday life with lessons such as "Don't take what doesn't belong to you" and "Do not harm others," we must act responsibly in the cyber world as well.

The basic rule is "Do not do something in cyberspace that you would consider wrong or illegal in everyday life."

UNIT-4- MEDIA AND MEDICAL ETHICS

This unit covers Media and Medical ethics is the best division of applied ethics dealing with the specific ethical principles and standards of media (including broadcast media, film, theatre, the arts, print media and the internet) and medicine (practice of clinical medicine and related scientific research)

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 • Project

Relevant Websites, CD's and Documentaries

- https://plato.stanford.edu/

Learning Resources:

- learn.talentsprint.com

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

1	No. of Internal Tests:	01	Max. Marks for each Internal Test:	20
2	No. of Assignments:	01	Max. Marks for each Assignment:	05
3	No. of Quizzes:	01	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

SKILL DEVELOPMENT COURSE III - TECHNICAL SKILLS
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: **U19PE510ME**
Credits :01	CIE Marks:30	Duration of SEE: 02 Hours

COURSE OBJECTIVE *The objective of the course is to*	**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

Programming 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 01 (along with II int)		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: **1 Hour 30 minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

DYNAMICS AND METROLOGY LAB

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: **U19PC531ME**
Credits :01	CIE Marks:30	Duration of SEE: 03Hours

COURSE OBJECTIVES *The objective of this course is to*	**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; 2 apply principles of metrology in the measurement using various instruments and transducers.	1 analyze the cam profile for different motion characteristics, Analyze the forces in Governors, Gyroscope and a system of rotating masses in different planes. 2 determine the vibration response of free and forced vibrating systems. 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 determine thread angles using Toolmakers microscope, tool angle using Profile projector 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.
8 To study the single degree of freedom system using MATLAB / Simulink

METROLOGY LAB

9 To conduct linear& surface roughness measurements.
10 To calibrate the various thermo couples and LVDT
11 To perform the design of snap gauge.
12 To find the chordal thickness of a gear tooth using Gear tooth vernier
13 Determination of screw thread angles using Toolmakers microscope
14 Determination of Tool Angles using Profile Projector
15 To make alignment test on lathe machine.

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

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

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 **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): 0:0:2	SEE Marks:50	Course Code: **U19PC541ME**
Credits :01	CIE Marks:30	Duration of SEE: 03 Hours

COURSE OBJECTIVE *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able 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 and calculation of moisture content and Grain Fineness Number
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

6. Identification of different types of flames and making a butt joint with gas welding.
7. Making a lap joint by resistance welding process and strength evaluation.
8. Analysis of bead geometry using AC and DC welding processes.
9. Demo of TIG and MIG welding processes.

10. Exercise on submerged arc welding.

Forming

11. Evaluation of formability using Erichsen cupping test.
12. Design study of simple dies and performing blanking and piercing operations and theoretical estimation of loads.
13. Study of simple, compound and progressive dies and making simple components.
14. Study of process parameters for injection moulding.

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

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

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 **Hours**			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

Programming for Mechanical Engineering Lab

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:--	Course Code: **U19PW519ME**
Credits :01	CIE Marks: 30	Duration of SEE: -----

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able to*
enable the student to take up investigative study in the field of mechanical engineering using programming.	1 choose appropriate field of interest, review the literature and define the problem. 2 Plan the activities for carrying out the project work in teams to solve the identified problem using programming. 3 conduct investigations on the chosen problems, give conclusions and prepare the report.

1. Program to find temperature distribution along a plane slab and to estimate heat transfer rate
2. Program to find temperature distribution given object and to estimate heat transfer rate
3. Program to find temperature distribution along a composite system and to estimate heat transfer rate
4. Program to estimate fin efficiency and effectiveness
5. Program to find heat transfer co-coefficient for flow over a flat plate and to estimate heat transfer rate
6. Cylinder subjected to Internal Pressure
7. Study of laminar flow through a pipe
8. Study of Turbulent flow through a pipe
9. Study of impact of free jet on different vanes
10. Two Dimensional Stress analysis
11. Cylinder subjected to Internal Pressure
12. Write a program to find position, velocity and acceleration for a slider crank mechanism

13. Vibration Analysis
14. Gauss elimination program
15. Thomas algorithm
16. Simpson's 1/3 rule & Simpson's 3/8 rule
17. Four Bar Mechanism Simulation

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

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

No. of Internal Tests:	-	Max. Marks for Internal Test:	-
Marks for assessment of Mini Project using Rubrics			30

VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-19)
B.E. – MECH : SIXTH SEMESTER (2021-2022)

B.E (MECH) VI Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
U19PC620ME	CAD/CAM	3	-	-	3	60	40	3
U19PC630ME	Machine Design	3	-	-	3	60	40	3
U19PC640ME	Metal Cutting and Machine Tools	3	-	-	3	60	40	3
U19PE6xxME	Professional Elective - I	3	-	-	3	60	40	3
U19OE6XXXX	Open Elective-IV	3	-	-	3	60	40	3
U19HS610EH	Skill Development Course IV - Aptitude 3 (Verbal)	1	-	-	2	40	30	1
U19PE610ME	Skill Development Course IV - Technical Skills	1	-	-	2	40	30	1
U19MC010CE	Environmental Science	2	-	-	3	60	40	0
PRACTICALS								
U19PC621ME	CAD/CAM Lab	-	-	2	3	50	30	1
U19PC641ME	Machine Tools Lab	-	-	2	3	50	30	1
U19PW619ME	Theme Based Project	-	-	2	-	0	30	1
	TOTAL	**19**	**-**	**6**		**540**	**390**	**20**
	GRAND TOTAL	**25**				**930**		**20**

1) Student should acquire one online course certificate equivalent to two credits during III to VII semester
2) Left over hours allotted to Sports / Library / Mentor Interaction / CC / RC / TC / CCA / ECA

List of Professional Electives - Stream wise (R-18)											
		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
Sem VI	PE-I	U19PE610ME	Vibration Analysis and Noise Control	U19PE620ME	Production Drawing	U19PE630ME	Renewable Energy Systems	U19PE640ME	Operations Research	U19PE650ME	Automotive Chassis Components

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

CAD / CAM

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19PC620ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able to*
analyze different types of modeling 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 Identify the different types of Modelling Techniques in CAD and the basic entities which are useful in Model creation. 2 Analyse the concepts of SOLID MODELLING, SURFACE MODELLING and the associated Geometric transformations. 3 Understand the basic concepts of NC machines and their programming. 4 Distinguish between CNC and NC and Summarize the concepts of Industrial Robots. 5 Understand the basic concepts of CIM and FMS and their extension to the present day Industry

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.

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

MACHINE DESIGN

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19PC630ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able 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 2 condition. design helical and leaf springs under direct 3 and eccentric loading for various applications. 4 design gears under strength and wear conditions for power transmission. design sliding contact bearings for supporting shafts/axles under radial and 5 thrust loads. design rolling contact bearings for supporting shafts /axles under static and dynamic loads. design piston, connecting rod and crank shaft for I.C. Engine 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 radial 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:	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

METAL CUTTING AND MACHINE TOOLS
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19PC640ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able 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, their constructional features and operations. 2 identify and use flat surface generating machines and able to perform gear cutting operations. 3 understand the importance of surface finishing methods and work holding devices. 4 compute forces in machining operations , tool material, tool geometry and principles of non conventional machining methods. 5 interpret functioning of coolants in metal cutting and thermal effect on tool wear, tool life and economics.

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.
Gear cutting machines: Form cutting, Generation methods, Gear Hobbing, Gear shaping and gear finishing machines.

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, "Manufacturing Science", 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

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: **U19PE610ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able 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 express equations of motion for vibrating systems through mathematical models to derive system parameters 2 illustrate the motion characteristics of multi degree of freedom systems through various methods 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 vibration analysis – Basics of SHM - Mathematical modelling of vibrating systems - Discrete and continuous systems - single-degree freedom systems - free and forced vibrations, damped and undamped vibrations.

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, "Industrial Noise Control and 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: **U19**
Credits :03	CIE Marks:40	Duration of SEE:03

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTC** *On completion of the course, students*	
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	revise the fundamentals of draw to implement them later in Produ
	2	understand limits, fits and to on drawings to get suitable fi
	3	understand the need for su surfaces in contact to select suit
	4	prepare the process sheet for v the sequence of mfg processes work holding details.
	5	prepare production drawings for indicating all conventions require

UNIT-I: **INTRODUCTION**
Need for production drawing, drawing sheet layout, title block, code designation of steels, copper and Aluminum alloys, Conventional representation of materials and machine components, welding symbols, hydraulic and pneumatic symbols, drafting 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, indication of surface roughness symbols on drawings.

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)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

RENEWABLE ENERGY SYSTEMS (PE-I)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19PE630ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able to*
study the availability and	1 **Illustrate** the constructional

applications of various renewable energy systems like solar energy, wind energy, geothermal energy, ocean thermal energy, tidal and wave energy, fuel cell energy and biomass energy.		details and working of solar energy conversion devices for various heating and cooling applications.
	2	**describe** the working of different wind and geothermal energy conversion systems used for power generation.
	3	**explain** the working of ocean thermal, tidal and wave energy power plants for power generation.
	4	**illustrate** the constructional details, working and applications of different fuel cells.
	5	**discuss** the constructional details, working of different types of bio gas plants for domestic cooking and other applications.

UNIT I

Solar Energy: Availability of solar energy, Measurement of sunshine, solar radiation data, estimation of average solar radiation, solar energy selection, selective surfaces, constructional details and working 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 module and 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; Site selection to establish wind turbine power plants, Aerodynamic models, Rankine Froud Actuator disc model.

Geothermal Energy: Earth as source of heat energy; Nature of Geothermal Fields, Geothermal sources. Hydrothermal sources; vapor dominated systems; Liquid dominated systems. Petro thermal systems and Geo pressure systems.

UNIT III

Ocean Thermal Energy: Ocean thermal energy sources, Ocean thermal energy power plant development; Closed and open cycles: advantages and operating difficulties.

Tidal Energy: Classification and working of Tidal power plants, Limitations of Tidal energy.

Ocean Wave Energy Technology: Classification of wave energy conversion devices; working of heaving float type, pitching type, heaving and pitching float type, oscillating water column type and surge devices.

UNIT IV

Fuel Cell Energy: Description, classification and operation of fuel cells; major components & general characteristics of fuel cells; working of Alkaline Fuel Cell, Direct Methanol Fuel Cell, Phosphoric Acid Fuel Cell, Solid Oxide Fuel Cell, Proton/Polymer exchange membrane fuel cell molten carbonate fuel cell systems.

UNIT V

Bio-mass Energy: conversion techniques for the production of liquid and gaseous fuels by bio-chemical methods - types of feed stock, constructional details and working of fixed dome, flexible bag and floating dome type bio gas plants, Digester design considerations 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. B.H.Khan, "Non-Conventional Energy Sources", TataMcGraw-HillEducation Private Limited, New Delhi.
4. S.Rao, Dr.B.B.Parulekar Energy Technology(Non-conventional, Renewable and Conventional), Khanna Publishers,Delhi.
5. 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

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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

OPERATIONS RESEARCH (PE-I)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19PE640ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able 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 Apply optimization in multi disciplinary areas through linear programming under different working conditions. 2 Analyze linear programming for a dynamic changes of a customer requirements to suit various Organizations. 3 Reduce total cost to apply for transportation techniques for the transshipment of Goods and products for a product based industry. 4 Estimate the time for replacement of a machine by considering or ignoring time value of money using individual/group replacement policy. 5 Estimate elapsed time for sequencing problem processed through different machines. 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: **U19PE650ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able to*
study the various components of the power transmission system of an automobile.	1 List out the types of chassis layouts, frames and materials used for heavy duty, light duty and examine their specification with standards 2 Illustrate and verify the concepts, construction, material related to front axle and steering system for a typical heavy duty, light duty vehicles 3 List and verify the concepts, construction and material used for clutch, gearbox, rear axle, differential, multiaxle and multy speed. 4 Consolidate the concepts, types, construction and operation of different suspension systems. 5 Classify and inspect the different braking system used in heavy duty, light duty 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. Types of clutches, torque converter, manual and automatic transmission system. Propeller shaft, universal joints, front wheel drive, different types of final drive, double reduction and twin speed final drives. 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-IV: SUSPENSION SYSTEM

Need of suspension system, types of suspension systems. Suspension springs and constructional details. Characteristics of leaf springs, coil springs and torsion bar. Independent suspension, rubber suspension, pneumatic suspension, shock absorbers.

UNIT-V :BRAKING SYSTEM

Classification of Brakes, Drum Brakes and Disc Brakes-Constructional Details, Theory of Braking, Concept of Dual Brake System, Parking Brake, Material, Hydraulic System, Vacuum Assisted System, Air Brake System, Antilock Braking, Retarded Engine Brakes, Eddy Retarders. Recent Advancements in Braking System, Traction Control and Stability Control – Brake by Wire.

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**

B.E. VI SEM OPEN ELECTIVE-IV COURSES			
Dept.	**Course Name**	**Code No.**	**Credits**
CIVIL	Project Management	U19OE610CE	3
MECH.	Additive manufacturing and its applications	U19OE610ME	3
	Alternative Fuels and Energy Systems	U19OE620ME	3
	Industrial Administration and Financial Management	U19OE630ME	3

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

DEPARTMENT OF CIVIL ENGINEERING
PROJECT MANAGEMENT (Open Elective-IV)

SYLLABUS FOR B.E. VI SEMESTER

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: U19OE610CE
Credits: 3	CIE Marks:40	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. 5. Interpret the concept of Linear Programming and solve problems by Graphical and Simplex methods.

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

UNIT-III

Time Cost Analysis: Cost time analysis in network planning, updating. Earned value Management.

UNIT-IV

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

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

UNIT-V

Linear programming and optimization Techniques: Introduction to optimization – Linear programming, Importance of optimization, Simple problems on formulation of LP, Graphical method, Simplex method.

Learning Resources:

1. Srinath L.S., PERT and CPM: Principles and Application, East-West Press, 2001.
2. Kumar Neeraj Jha., Construction Project Management: Theory and Practice, Pearson Education,

India, 2015.
3. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2019.
4. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 2016.
5. Choudhary S., Project Management: Tata McGraw Hill Publishing Company Limited, New Delhi-.
6. http://nptel.ac.in/courses/

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

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEEING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E VI Semester

Additive Manufacturing and its Applications

(Open Elective-IV)

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U19OE610ME
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: understand the fundamentals of various additive manufacturing technologies and their applications in Engineering Industry.	On completion of the course the student will be able to: 1. Understand the fundamentals of prototyping and the various data formats used in Additive Manufacturing. 2. Study the principle, process, advantages, limitations and case studies of liquid based AM systems. 3. Study the principle, process, advantages, limitations and case studies of solid based AM systems. 4. Study the principle, process, advantages, limitations and case studies of powder based AM systems. 5. Study the applications of AM in various engineering industries as well as the medical field.

Unit-I

Introduction, Prototyping fundamentals, Historical development, Advantages of AMT, Commonly used terms, **Fundamental Automated Processes,** process chain, 3D modeling, Data Conversion, and transmission, Checking and preparing, Building, Post processing, RP data formats, **Newly Proposed formats,** Classification of AMT process.

Unit-II

Liquid based systems: Stereo lithography apparatus (SLA): Models and specifications, process, working principle, photopolymers, photo

polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies.
Solid ground curing (SGC): Models and specifications, process, working, principle, applications, advantages and disadvantages, case studies.

UNIT III

Solid based systems: Laminated object manufacturing (LOM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.
Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

Unit-IV

Powder Based Systems: Selective laser sintering (SLS): Models and specifications, process, **materials,** working principle, applications, advantages and disadvantages, case studies.
Three dimensional printing (3DP): Models and specification, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-V

Applications of AM systems: Applications in **Design,** aerospace industry, automotive industry, jewellery industry, coin industry, GIS Application, arts and architecture.
RP medical and bio engineering Application: planning and simulation of complex surgery, customized implant and prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bio-molecules.

Learning Resources:

1. Chua C.K., Leong K.F. and LIM C.S Rapid prototyping: Principles an Applications, World Scientific publications, 3rdEd., 2010
2. D.T. Pham and S.S. Dimov, "Rapid Manufacturing", Springer, 2001
3. Terry Wohlers, " Wholers Report 2000", Wohlers Associates, 2000
4. Paul F. Jacobs, " Rapid Prototyping and Manufacturing"–, ASME Press, 1996
5. Ian Gibson, Davin Rosen, Brent Stucker "Additive Manufacturing Technologies, Springer, 2nd Ed, 2014.

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

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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

SYLLABUS FOR B.E VI Semester

Alternative Fuels and Energy Systems (Open Elective-IV)

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U19OE620ME
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Out comes
The objectives of this Course are: To broaden the knowledge of alternate fuels and energy system and to understand the manufacturing and operating characteristics of alternative fuels.	On completion of the Course, the student will be able to: 1. Identify the need for alternative fuels. 2. Explain the characteristic features of bio-fuels. 3. Elucidate the properties of biogas, LPG & CNG. 4. Identify the merits and challenges of hydrogen and fuel cell based vehicles. 5. Explain the characteristics of electric and hybrid vehicles.

UNIT – I

Need for Alternative Fuels:

Working of I.C. Engine; Properties of Fuels; Fuel Rating; Study of various performance parameters related to properties of different types of fuels; Fossil Fuels: Sources, scope of availability; Need for Alternative Fuels; Effects of constituents of Exhaust gas emission on environment; Green house effect, Factors affecting green house effect.

UNIT – II

Alcohols:

Sources of Methanol and Ethanol, methods of it's production. Properties of methanol & ethanol as engine fuels, Use of alcohols in S.I. and C.I. engines, performance of blending methanol with gasoline. Emulsification of alcohol and diesel. Dual fuel systems. Improvement / Change in emission characteristics with respect to % blending of Alcohol.

Bio-diesels:

Base materials used for production of Bio-diesel; Properties of Diesel blended with vegetable oils and difference in performance characteristics of Engine.

Synthetic Alternative Fuels: Di-Methyl Ether **(**DME), P-Series, Eco-friendly Plastic fuels (EPF).

UNIT – III

Biogas:

Introduction to Biogas system; Extraction process; Factors affecting biogas formation; Usage of Biogas in SI engine & CI engine;

LPG & CNG: Properties of LPG & CNG as engine fuels, fuel metering systems, combustion characteristics, effect on performance, emission, cost and safety.

UNIT – IV

Hydrogen:

Hydrogen as a substitute fuel; Properties, Sources and methods of Production of Hydrogen; Storage and Transportation of hydrogen; Advantages of hydrogen (Liquid hydrogen) as fuel for IC engine/ hydrogen car; Layout of a hydrogen car;

Fuel Cells: Concept of fuel cells based on usage of Hydrogen and Methanol; Power rating and performance; Layout of fuel cell vehicle.

UNIT – V

Electric & Hybrid Vehicles:

Layout of an electric vehicle; Systems and components; electronic controlled systems; high energy and power density batteries; Types of hybrid vehicles; advantages & limitations.

Solar Powered Vehicles:

Solar cells for energy collection, Storage batteries; Layout of solar powered automobiles; Advantages and limitations.

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

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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

SYLLABUS FOR B.E VI Semester

Industrial Administration and Financial Management

(Open Elective-IV)

Instruction: 3 Hours / week	SEE Marks:60	Course Code : U19OE630ME
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Out comes
The objectives of this course are to: 1. aware about types of business forms, organization structures, plant layouts, merits, demerits and applications. 2. understand method study procedure, PME, time study techniques and wage incentives. 3. importance of PPC and improving quality by control charts and sampling plants. 4. optimization of inventory to minimize total cost and other optimization techniques like LPP, project management techniques. 5. estimate selling price of a product, TVM and budgeting techniques, depreciation methods.	*On completion of the course, the student will be able to:* 1. understand business forms, organization structures and plant layouts. 2. implementation of method study and estimation of standard time. 3. understand types of production, functions of PPC, quality control by charts and sampling. 4. implement optimization techniques like LPP, assignment and project management techniques. 5. understand BEA, estimation of depreciation, selling price of a product and capital budgeting techniques.

UNIT – I

Industrial Organization : Types of various business organisations. Organisation structures and their relative merits and demerits. Functions of management.

Plant location and layouts: Factors affecting the location of plant and layout. Types of layouts and their merits and demerits.

UNIT – II

Work study: Definitions, Objectives of method study and time study. Steps in conducting method study. Symbols and charts used in method study. Principles of motion economy. Calculation of standard time– by– time study and work sampling. Performance rating factor.

Types of ratings. Jobs evaluation and performance appraisal. Wages, incentives, bonus, wage payment plans.

UNIT – III

Inspection and quality control: Kinds and Types, objectives of inspection, Sampling inspection quality control by chart and sampling plans. Quality circles.

Production planning and control: Types of manufacture. Types of production. Principles of PPC and its functions.

UNIT – IV

Optimisation: Introduction to linear programming and graphical solutions. Assignment problems.

Project Management: Introduction to CPM and PERT. Determination of critical path.

Material Management: Classification of materials. Materials planning. Purchasing procedure of a material for an industry Duties of purchase manager and Stores department. Determination of economic order quantities. Types of materials purchase.

UNIT – V

Cost accounting: elements of cost. Various costs. Types of overheads, calculation of selling price. Break even analysis and its applications. Depreciation. Methods of calculating depreciation fund. Nature of financial management. Time value of money. Techniques of capital budgeting and methods.

Learning Resources:

1. Pandey I.M., "Elements of Financial Management", Vikas Publ. House, New Delhi, 1994
2. Khanna O.P., "Industrial Engineering and Management", Dhanapat Rai & Sons.
3. Everrete E Admaa & Ronald J Ebert , "production and Operations Management", 5th Ed. , PHI , 2005
4. S N Chary, "Production and Operations Management", 3rd Ed. , Tata McGraw Hill, , 2006
5. Pannerselvam, "production and Operations Management", Pearson Education, 2007

6. 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 HUMANITIES & SOCIAL SCIENCES

Skill Development Course IV – Aptitude 3 (Verbal)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P (Hrs/week): 2:0:0	SEE Marks:40	Course Code: **U19BS430EH**
Credits :01	CIE Marks:30	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
This course aims at enhancing employability skill I:	At the end of the course students will be able to:
Students will be introduced to higher order thinking and problem solving in the following areas - Vocabulary, Fill in the Blanks, Passage Based Questions, Jumbles & Spotting the Errors	Solve questions in Verbal Ability in the mentioned areas using shortcuts and smart methods
Students will be trained to work systematically with speed and accuracy while problem solving	Solve questions with speed and accuracy.
Students will enhance their vocabulary and use it effectively to solve problems	Clear the Verbal Ability Section in Employment Eligibility Tests

Unit I: Vocabulary- Reading for Content and Context
Overview:
This course is designed for students to not just understand the importance of vocabulary but also to build on it by using the appropriate tools and methods. After which they will be able to solve vocabulary based questions and also use vocabulary as a tool to solve problems.

Learning Outcomes
Upon completion of the course, students should be able to:
1. Use context to find the meanings of words
2. Possess better vocabulary
3. Use vocabulary as a tool to solve questions in verbal ability

Competencies

1. Understand Collocations
2. Build on words by using Root Words
3. Understand how prefixes and suffixes work
4. Identify incorrect usage of words

Sessions

1.1 Concepts & Context Rules: Collocations & Phrasal Verbs
1.2 Prefixes/ Suffixes & Root Words
1.3 Phrases & Idioms; Questions based on it
1.4 One Word Substitution; Questions based on it
1.5 Antonyms, Synonyms & Incorrect Word Usage

Unit II: Fill in the Blanks- Applying Content and Context
Overview:

This course is designed for students to identify the clue/ theme words in sentences, then understand the context in which the words are used and finally apply concepts like collocation, antonyms, and synonyms to solve questions.

Learning Outcomes

Upon completion of the course, students should be able to:

1. Identify the theme/ clue words in sentences
2. Solve Single & Double Fill in the blank questions
3. Solve Cloze tests by applying collocations and contextual vocabulary

Competencies

1. Use contextual vocabulary to solve problems
2. Apply vocabulary based tools
3. Apply tricks to solve questions

Sessions

2.1 Concepts & Rules: Single Fill in the Blanks
2.2 Double/ Triple Fill in the Blanks
2.3 Cloze Test

Unit III: Jumbles
Overview:

This course is designed to develop and improve reading and study skills needed for college work. Topics include identifying main idea and supporting details, determining author's purpose and tone,

distinguishing between fact and opinion, identifying patterns of organization in a sentence or passage and the transition words associated with each pattern, recognizing the relationships between words and sentences, identifying and using context clues to determine the meanings of words, identifying logical inferences and conclusions.

Learning Outcomes

Upon completion of the course, students should be able to:

1. Identify the structure of sentences & paragraphs
2. Apply tools of vocabulary and context to organize content
3. Solve questions on jumbled sentences & parajumbles

Competencies

1. Identify the author's purpose, point of view, tone, and method of development.
2. Use tools of language and logic to solve problems
3. Synthesize information given into logically correct sentences or passages

Sessions

3.1 Concepts- Purpose, Tone, Point of view
3.2 Parajumbles
3.3 Jumbled Sentences

Unit IV: Critical Reading Skills

Overview:

Research shows that good reading skills can lead to well written assignments. In this unit, students will learn, develop and improve reading and study skills needed for college work. Building on these basic strategies, students will develop skills to critically analyze texts and then the ability to identify its theme.

Learning Outcomes

Upon completion of the course, students should be able to:

1. Read a given text critically and propaganda techniques
2. Use contextual Vocabulary to find out meanings of new words
3. Use comprehension and vocabulary strategies to raise reading rate.

Competencies

1. Analyze text, e.g., simple outlining and note taking, summarize, draw conclusions, and apply information to personal experiences.
2. Increase speed of reading
3. Solve Reading Comprehensions using elimination strategies
4. Identify the theme of the passage

Sessions

4.1 Concepts- Basic Introduction & Short Passages
4.2 Article & Article Based Passages
4.3 Theme Detection

Unit 5: Spotting the Errors

Overview:

In this unit students will focus on identifying errors in sentences, rectifying them and improving the quality of sentences. Building on these skills will also have an impact on the written and spoken skills of students since they will be aware of the common and often made errors and therefore be able to avoid them while using language.

Learning Outcomes

Upon completion of the course, students should be able to:

1. Read, identify and rectify errors in sentences
2. Improve the quality of sentences by fixing errors
3. Use comprehension and vocabulary strategies to raise reading rate.

Competencies

1. Analyze language and improve its quality
2. Apply tips and tricks to solve questions faster
3. Improve the quality of their writing by being aware of the common errors

Sessions

5.1 Concepts- Basic Introduction & Sentence Fillers
5.2 Spot the Errors
5.3 Sentence Improvement

METHODOLOGY	**ASSESSMENTS**
- Demonstration - Presentations - Expert lectures - Writing and Audio-visual lessons	- Online assignments - Individual and Group

Learning Resources:
learn.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:	05
3	No. of Quizzes:	02	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

SKILL DEVELOPMENT COURSE IV - TECHNICAL SKILLS

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: **U19PE610ME**
Credits :01	CIE Marks:30	Duration of SEE:02Hours

COURSE OBJECTIVES *The objective of this course is to*	**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 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:	**1 Hour 30 Minutes**		

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

ENVIRONMENTAL SCIENCE

SYLLABUS FOR B.E. II-SEMESTER

L : T : P (Hrs./week): 2 : 0 : 0	SEE Marks:60	Course Code: U19MC010CE
Credit: - - -	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	*Upon the completion of this course students will be able to*
1. Describe various types of natural resources available on the earth surface. 2. Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems. 3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity. 4. Explain the causes, effects and control measures of various types of environmental pollutions. 5. Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, population explosion.	1. Describe the various types of natural resources. 2. Differentiate between various biotic and abiotic components of ecosystem. 3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India. 4. Illustrate causes, effects, control measures of various types of environmental pollutions. 5. Explain the methods of water conservation, causes, effects of climate change, global warming, acid rain and ozone layer depletion, population explosion.

UNIT-I: Environmental Studies: Definition, importance of

environmental studies. Natural resources: Water resources; floods, drought, conflicts over water, dams-benefits and problems. Food resources; Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity. Energy resources: Renewable and non-renewable energy resources. Land Resources, soil erosion and desertification.

UNIT-II: Ecosystems: Structure and function of an ecosystem, producers, consumers and decomposers, food chains, food webs, ecological pyramids, aquatic ecosystems (ponds, oceans, estuaries).

UNIT-III: Biodiversity: Genetic, species and ecosystem diversity. Values of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV: Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste & e-waste management.

UNIT-V: Social Aspects and the Environment: Water conservation, Climate change, global warming, acid rain, ozone layer depletion. Environmental Impact Assesment, population explosion.

Learning Resources:

1. Deswal S. and Deswal A., A Basic Course on Environmental studies, DhanpatRai& Co Pvt. Ltd. 2016
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2017
3. Suresh K. Dhameja, Environmental Studies, S.K. Kataria& Sons, 2010.
4. De A.K., Environmental Chemistry, New Age International, 2003.
5. Odum E.P., Fundamentals of Ecology, W.B. Sunders Co., USA, 2004.
6. Rajagopalan R., Environmental Studies, Second Edition, Oxford University Press, 2015

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

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

CAD / CAM LAB

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:50	Course Code: **U19PC621ME**
Credits :01	CIE Marks:30	Duration of SEE: 03 Hours

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

I. CAD:

1. 2-D Sketching, annoatations of simple views.
2. Constraining of 2-D sketches.
3. Constraining of 2-D complex sketches.
4. Development of sectional views and assigning of materials.
5. Introduction to development of 3-D components.
6. Development of 3-D components using sweeping, extrusion and revolve etc.
7. Introduction and assembly of Flange coupling.
8. Assembly of Plummer block and Universal coupling
9. Assembly of Connecting rod.
10. Motion simulation of mechanisms
11. Motion simulation of manipulator

II. CAM:

12. Introduction of manual part programming using G-codes and M-codes.
13. Manual part program for Plain turning and step turning for CNC lathe.
14. Manual part program for taper turning and thread cutting for CNC lathe.
15. Manual part program for linear and circular interpolation for CNC Mill.
16. Manual part program for contouring and pocketing for CNC Mill.
17. Automatic part program generation for a 3-D model using manufacturing module.
18. Manufacture of a 3-D component using additive manufacturing.
19. Point cloud data acquisition through 3D scanner.

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

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 **Hours**			

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: **U19PC641ME**
Credits :01	CIE Marks:30	Duration of SEE: 03Hours

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able to*
familiarise the student with various machine tools, machining operations and 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.

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

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

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 **Hours**			

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

Department of Mechanical Engineering

THEME BASED PROJECT
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:0	Course Code: **U19PW619ME**
Credits :01	CIE Marks:30	Duration of SEE: ---

COURSE OBJECTIVES *The objective of this course is to*	**COURSE OUTCOMES** *On completion of the course, students will be able to*
enable the student to take up investigative study in the field of mechanical engineering.	1 Identify appropriate field of interest, review the literature and define the problem. 2 Plan the activities for carrying out the research work in teams to solve the identified problem using different resources. 3 Conduct the investigations on the chosen problem and prepare the final report.

The theme-based project can be assigned on individual basis or to a group consisting of maximum three students per batch.

The students are required to identify the topic of their interest and collect data / literature in the area like supporting aids for disabled people, Domestic appliances, Agriculture equipments, Eco friendly products, Health care equipment, Machine tool Engineering, Advanced welding technologies, Automobile Engineering, Alternative fuels, Fluid flow systems, Refrigeration systems, Energy conservation, Power generation, Robotic Engineering, Mechatronics, IOT in Mechanical Engineering etc. 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.

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 Theme based Project using Rubrics			30