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-20)
WITH EFFECT FROM 2022-23
(For the students admitted in 2020-21)

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

VISION OF THE INSTITUTE

Striving for a symbiosis of technological excellence and human values.

MISSION OF THE INSTITUTE

To arm young brains with competitive technology and nurture holistic development of the individuals for a better tomorrow.

VISION OF THE DEPARTMENT

To establish global leadership in the field of mechanical engineering and develop competent human resources with values and ethics

MISSION OF THE DEPARTMENT

To nurture an environment of research, innovation and knowledge through the latest teaching-learning practices in mechanical engineering

PROGRAM OUTCOMES (POs)	
1	Graduates demonstrate knowledge of basic sciences and mechanical engineering.
2	Graduates demonstrate an ability to identify, formulate and solve engineering problems
3	Graduates demonstrate an ability to design and conduct experiments, analyze and interpret data.
4	Graduates demonstrate an ability to design a system, component or process as per needs and specifications
5	Graduates demonstrate skills to use modern engineering tools, software and equipment to analyze for problem solving.
6	Graduates demonstrate an ability to visualize and work on laboratory and multi disciplinary tasks.
7	Graduate shows the understanding of impact of environment and society of engineering solutions and aim to provide sustainable solutions.
8	Graduates demonstrate knowledge of professional and ethical responsibilities.
9	Graduates shall be able to work independently and also in multi disciplinary teams
10	Graduates are able to communicate effectively in both verbal and written form.
11	Graduates will demonstrate the ability to handle the projects through appropriate project management techniques.
12	Graduates develop confidence for self education and ability for life-long learning

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The mechanical engineering graduates will

PEO1 possess the required foundation and knowledge in the field of mechanical engineering.

PEO2 advance professionally as a result of their ability to solve technical problems and work in multidisciplinary teams leading to significant contribution to the industry

PEO3 acquire life long learning through training programs and higher qualifications.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1 Apply principles of basic sciences and engineering to mechanical systems

PSO2 Model, analyze, design, and realize mechanical components and processes

PSO3 Be prepared to work professionally and ethically in thermal, design and manufacturing areas of mechanical engineering

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-20)
B.E. – MECH : FIFTH SEMESTER (2022-2023)

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								
U20PC510ME	Heat Transfer	3	-	-	3	60	40	3
U20PC520ME	CAD/CAM	3	-	-	3	60	40	3
U20PC530ME	Dynamics of Machines	3	-	-	3	60	40	3
U20PC540ME	Manufacturing Processes	3	-	-	3	60	40	3
U20PC550ME	Design of Machine Elements	3	-	-	3	60	40	3
U20OE5XXXX	Open Elective - III	3	-	-	3	60	40	3
U20HS510EH	Skill Development-V (Communications Skills-II)	1	-	-	2	40	30	1
U20PE510ME	Skill Development-VI (Technical Skills-II) (Mathematical Programming)	1	-	-	2	40	30	1
U20HS010EH	Human Values and Professional Ethics-II	1	-	-	2	40	30	1
PRACTICALS								
U20PC531ME	CAD / CAM Lab	-	-	2	3	50	30	1
U20PC541ME	Manufacturing Processes Lab	-	-	2	3	50	30	1
U20PC551ME	Programming for Mechanical Engineers Lab	-	-	2	3	50	30	1
	TOTAL	**21**	**0**	**6**		**630**	**420**	**24**
	GRAND TOTAL	**27**				**1050**		**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: U20PC510ME
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 engineering problems in conduction, convection and radiation heat transfer together with 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: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

CAD / CAM

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U20PC520ME
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

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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: U20PC530ME
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, partial balancing of two cylinder locomotives. 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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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 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: U20PC540ME
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.

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

Duration of Internal Test: **90 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: U20PC550ME
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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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: 90 Minutes

B.E- V SEM OPEN ELECTIVE-III COURSES			
Dept.	**Title**	**Code**	**Credits**
Mech	Introduction to Robotics	U20OE510ME	3
	Introduction to Automobile Engineering	U20OE520ME	3
Civil	Spatial Information Technology	U20OE510CE	3
CSE	Introduction to Operating System	U20OE510CS	3
	Web Designing	U20OE520CS	3
EEE	Solar Power and applications	U20OE510EE	3
ECE	Sensors for Engineering Applications	U20OE510EC	3
	Mathematical Programming for Engineers	U20OE010EC	3
IT	Introduction to Database Management Systems	U20OE510IT	3
	Introduction to Statistical Learning	U20OE520IT	3
HSS	Basics of Entrepreneurship	U20OE530EH	3
	Design Thinking	U20OE510EH	3
	Technical Writing and Professional Presentation	U20OE520EH	3

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: U20OE510ME
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

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

Duration of Internal Test: **90 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 : U20OE520ME
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: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

SPATIAL INFORMATION TECHNOLOGY

(Open Elective-III)

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3:0: 0	SEE Marks:60	Course Code: U20OE510CE
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to	Upon the completion of the course, students are expected to
1. To provide fundamental knowledge on geo spatial technology such as Remote sensing GPS and GIS.	1. Select the type of remote sensing technique/data, identify and analyze the earth surface features from the satellite images. 2. Identify GPS components, interpret the navigational message and signals received by the GPS satellites, Identify the error sources and apply corrections for accurate positioning. 3. Analyse the basic components of GIS, process spatial and attribute data, identify and rectify mapping inaccuracies and prepare thematic maps

Unit-I: Introduction and Basic Concepts of Remote Sensing: Introduction, Basic concepts of remote sensing, Airborne and space born sensors, Passive and active remote sensing, EMR Spectrum, Energy sources and radiation principles, Energy interactions in the atmosphere, Energy interactions with earth surface features, Atmospheric windows, Spectral reflectance curves

Unit-II: Remote Sensing Systems: Satellites and orbits, Polar orbiting satellites, Image characteristics and different resolutions in Remote Sensing, Multispectral, thermal and hyperspectral remote sensing. Some remote sensing satellites and their features, Map and Image, color composites, introduction to digital data, elements of visual interpretation techniques. Applications of Remote sensing in various fields.

Unit-III: Global positioning Systems (GPS) : Overview of GNSS and Introduction to GPS, GLONASS, GALILEO, COMPASS, IRNSS systems , Applications of GPS.

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

Unit-IV: Errors and Positioning methods of GPS: Errors and biases in GPS measurements, Accuracy of navigation position: UERE and DOP, Intentional degradation of GPS signals: Selective availability (SA) and Anti-spoofing (AS) Differential GPS: Space based augmentation systems (e.g., SBAS, GAGAN) and Ground based augmentation systems (e.g., WASS, EGNOS). GPS Carrier Phase measurements: Single Differencing, Double Differencing and Triple Differencing in GPS measurements.

Unit-V: Basic Concepts: Introduction to GIS, History of GIS, Early development in GIS, Areas of GIS application, Components of GIS, Overview of GIS Software packages, Current issues and Trends in GIS. Variables-Point, line, polygon, Geographic coordinate system, Map projections, Map Analysis.
GIS Data: Data types – spatial, non-spatial (attribute data) – data structure, data format – point line vector – Raster – Polygon
Data Input : Keyboard entry, Manual Digitizing, Scanner, Remotely sensed data, Existing Digital data Cartographic database, Digital elevation data
Data Editing: Detection and correction of errors, data reduction, edge matching

Learning Resources:

1. James B. Campbell & Randolph H. Wynne., Introduction to Remote Sensing, The Guilford Press, 2011
2. Lillesand, Kiefer, Chipman., Remote Sensing and Image Interpretation, Seventh Edition, 2015
3. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015
4. Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System: Theory and Practice, Springer: Berlin, 2011.
5. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011.
6. Hofmann-Wellenh of, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013
7. Thanappan Subash., Geographical Information System, Lambert Academic Publishing, 2011.
8. Paul Longley., Geographic Information systems and Science, John Wiley & Sons, 2005
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. ArcGIS 10.1 Manuals, 2013.
11. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2008.

12. Burrough, P.A., Principles of GIS for Land Resource Assessment, Oxford Publications, 2005.
13. C.P.Lo & Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2002.

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 ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

INTRODUCTION TO OPERATING SYSTEMS

(Open Elective-III)

SYLLABUS FOR B.E. V SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20OE510CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Understand different Operating system Structures and Services.	1. Explain Operating system structures and internal structure of a process. 2. Compare CPU scheduling algorithms. Analyze Disk scheduling algorithms 3. Apply different techniques for Main memory management. 4. Describe file management techniques. 5. Describe deadlock handling methods.

UNIT-I:

Introduction to operating systems: Definition, User view and System view of the Operating system, Operating system structure, Operating system services.

Process: Process concept, Process Control block, Context switching.

UNIT-II:

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Round Robin

Device Management: Disk Scheduling algorithms: FCFS, SSTF, SCAN.

UNIT –III:

Memory Management: Swapping, Contiguous memory allocation: Fixed Partitioning, Variable Partitioning. Non-Contiguous memory allocation: Paging.

Virtual memory: Demand paging, Page replacement Algorithms: FIFO, Optimal, LRU.

UNIT –IV:

File System Interface: File Concept, Access Methods: Sequential, Indexed, and Direct

File System Implementation: File-System Structure, Allocation Methods: Contiguous, Linked and Indexed.

UNIT-V:

Deadlocks: System model, deadlock characterization: Mutual Exclusion, Hold and Wait, Non pre-emption, Circular wait. Deadlock Prevention, Deadlock Avoidance: Banker's algorithm.

Learning Resources:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, 9th Edition (2016), Wiley India.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, 2nd Edition (2001), Pearson Education, Asia.
3. Dhananjay, Dhamdhere.M, *Operating System-concept based approach*, 3rd edition (2009), Tata McGraw Hill, Asia
4. Robet Love: *Linux Kernel Development*, (2004)Pearson Education
5. Richard Stevens, Stephen Rago, *Advanced Programming in the UNIX Environment*, 3rd Edition(2013), Pearson Education
6. http://web.stanford.edu/~ouster/cgi-bin/cs140-spring19/index.php
7. https://nptel.ac.in/courses/106106144/

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 ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

WEB DESIGN (OPEN ELECTIVE-III)

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20OE520CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Develop web application using HTML, CSS, JavaScript and PHP.	1. Design static web pages. 2. Apply styles to the web pages. 3. Create dynamic web pages using JavaScript. 4. Design DTD and schema for a given XML file. 5. Develop server side components using PHP.

UNIT-I: Web Basics and overview: Introduction to Internet, World Wide Web, Web Browsers, Web Servers, URL, MIME, HTTP, Web Programmers Tool Box, Introduction to HTML Purpose of HTML and XHTML, Text Formatting, Hypertext Links, Images, Lists, Tables, Forms and Frames.

UNIT-II: Cascading Style Sheets- Levels of Stylesheet, Style Specification Formats, Selector Formats, Property Value Forms, Font Properties, List Properties, Alignment of Text, Box Model, Background Images, Borders, div and span tags, Conflict Resolution.

UNIT-III: JavaScript - Object Orientation and JavaScript, Primitives, Operations, Expressions, Control Statements, Object Creation, Arrays, Functions- Introduction, Program Modules in JavaScript, Programmer-Defined Functions, Function Definitions, Random-Number Generation, Scope Rules, JavaScript Global Functions, Recursion, Constructors, Regular Expressions, DOM Model, Events, Event Handling in JavaScript, JavaScript objects.

UNIT-IV: Introduction to XML, Syntax of XML, XML Document Structure, Document type Definition, Namespaces and Schemas.
Client-Server Architecture, Multi-tier Architecture, Web server.

UNIT-V: PHP- Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies and Session Tracking.

Learning Resources:

1. Robert W. Sebesta, "Programming the World Wide Web", Pearson Education.(4th Edition)
2. Uttam K.Roy, "Web Technologies", Oxford publishers.
3. http://www.w3schools.com
4. https://www.php.net/manual/en/tutorial.php

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 ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SOLAR POWER AND APPLICATIONS
Open Elective-III
SYLLABUS FOR B.E. V SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U20OE510EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES The course will enable the students to:	**COURSE OUTCOMES** On completion of the course, students will be able to
To impart the basics of solar energy harnessing and solar panel and array.	1. Compare different energy resources. 2. Identify and choose proper type of meter for solar radiation measurement. 3. Use proper solar thermal system according to the load requirements. 4. Categorize and compare photovoltaic cells. 5. Apply the knowledge of solar energy.

Unit – I

Fundamentals of Energy Sources: Oil crisis of 1973, Classifications of Energy Resources, Importance of Non-conventional energy sources, Advantages-disadvantages and salient features of Non-conventional energy sources.

Unit – II

Solar Energy Basics: Sun as a source of energy, the Earth, Radiation Spectrums, Extraterrestrial and Terrestrial Radiations, Depletion of solar Radiation, Pyranometer, Pyrheliometer, Sunshine Recorder.

Unit – III

Solar Thermal Systems: Solar Collectors, Solar Water Heater, Solar Passive space – heating and cooling systems, Solar Cookers, Solar furnaces, Solar thermal water pump, Vapour compression refrigeration and Solar pond Electric power plant.

Unit – IV

Solar Photovoltaic Systems: Solar Cell fundamentals, Cell characteristics, Cell classification, Module, Panel and Array, Maximizing the Solar PV output and load matching, MPPT.

Unit – V

Solar PV systems & Applications: Solar PV system classification - Stand-Alone Solar PV system and Grid-Interactive Solar PV system. Applications - Water Pumping, lighting, medical refrigeration, village power and Telecommunication.

Suggested Reading:

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

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

1.	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	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 ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Sensors for Engineering Applications

(Open Elective-III)

SYLLABUS FOR B.E. V - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U20OE510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. The student will come to know the various stimuli that are to be measured in real life instrumentation. 2. He will be able to select the right process or phenomena on which the sensor should depend on 3. He will be aware of the various sensors available for measurement and control applications.	On completion of the course, students will be able to 1. Appreciate the operation of various measuring and control instruments which they encounter in their respective fields. 2. Visualize the sensors and the measuring systems when they have to work in areas of interdisciplinary nature and also think of sensors and sensors systems when for a new situation they encounter in their career 3. Identify and select the right process or phenomena on which the sensor should depend on. 4. Know various stimuli that are to be measured in real life instrumentation.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1					1							2	
CO2	2	2		2			1							2	
CO3	1	1	1	2			1							2	
CO4	1	2	2											2	

UNIT - I

Introduction to sensors and transducers .Need for sensors in the modern world. Different fields of sensors based on the stimuli - various schematics for active and passive sensors. Static and dynamic characteristics of sensors - zero, I and II order sensors – Response to impulse, step, ramp and sinusoidal inputs. Environmental factors and reliability of sensors.

UNIT – II

Sensors for mechanical systems or mechanical sensors - Displacement - acceleration and force - flow of fluids - level indicators - pressure in fluids -

stress in solids. Typical sensors - wire and film strain gauges, anemometers, piezo electric and magnetostrictive accelerometers, potentio metric sensors, LVDT.

UNIT – III

Thermal sensors – temperature – temperature difference – heat quantity. Thermometers for different situation – thermocouples thermistors – color pyrometry.

Optical sensors: light intensity – wavelength and color – light dependent resistors, photodiode, photo transistor, CCD, CMOS sensors.

Radiation detectors: radiation intensity, particle counter – Gieger Muller courter (gas based), Hallide radiation detectors.

UNIT – IV

Magnetic sensors: magnetic field, magnetic flux density – magneto resistors, Hall sensors, super conduction squids.

Acoustic or sonic sensors: Intensity of sound, frequency of sound in various media, various forms of microphones, piezo electric sensors.

UNIT – V

Electrical sensors: conventional volt and ammeters, high current sensors, (current transformers), high voltage sensors, High power sensors.

High frequency sensors like microwave frequency sensors, wavelength measuring sensors.

MEMs and MEM based sensors.

Learning Resources :

1. Doebelin, "Measurement Systems: Application and Design", McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim "Microsensors, MEMS and Smart Devices", New York: Wiley, 2001.
3. Henry Bolte, "Sensors – A Comprehensive Sensors", John Wiley.
4. Jocob Fraden," Handbook of Modern Sensors, Physics, Designs, and Applications", Springer.
5. Manabendra Bhuyan," Intelligent Instrumentation Principles and Applications", CRC Press.
6. Randy Frank," Understanding Smart Sensors", Second edition, Artech House.

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 ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mathematical Programming for Engineers

(Open Elective-III)

SYLLABUS FOR B.E. V - SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U20OE010EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To provide fundamental knowledge of programming language for solving problems.	On completion of the course, students will be able to 1. Generate arrays and matrices for numerical problems solving. 2. Represent data and solution in graphical display. 3. Write scripts and functions to easily execute series of tasks in problem solving. 4. Use arrays, matrices and functions in Engineering applications 5. Design GUI for basic mathematical applications.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	3	-	-	-	-	-	-	-	-	2	3
CO2	-	2	-	-	3	-	-	-	-	-	-	-	-	2	3
CO3	1	1	2	2	3	-	-	-	-	-	-	-	-	2	3
CO4	1	2	-	-	3	-	-	-	-	-	-	-	-	2	3
CO5	-	1	1	1	3	-	-	-	-	-	-	-	-	2	3

UNIT - I : Introduction:

Basics of MATLAB,MATLAB windows, Advantages of MATLAB,on-line help, file types.

MATLAB Basics: Variables and Constants –Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating, Saving and Executing a Script File, Creating and Executing a function file.

Programming Basics: Data types-Operators – Hierarchy of operations, Relational and logical operators, if-end structure, if-else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

UNIT - II : Scripts and Functions

Script Files, Function Files, Debugging methods in MATLAB.

Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots-subplots-specialized 2D plots: stem-, bar, hist, pi, stairs, loglog, semilog, polar, comet 3D plots: Mesh, Contour, Surf, Stem3, ezplot.

UNIT - III : Numerical Methods Using MATLAB

Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, Simpson's 1/3 Rule for Numerical Integration. MATLAB functions for integration.

Linear Equations- Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigen vectors, Matrix factorizations, Advanced topics.

UNIT - IV : Nonlinear Equations

System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation, Straight line fit using Least Square Method, Curve fitting using built-in functions ployval and polyfit, cubic fit using least square method. Finding roots of a polynomial -roots function, Newton-Raphson Method.

UNIT - V :

Solution of Ordinary differential Equations(ODEs)-The 4th order Runge-kutta Method, ODE Solvers in MATLAB, Solving First –order equations using ODE23 and ODE45.

Structures and Graphical user interface using app Designer: Advanced data Objects, How a GUI works, Creating and displaying a GUI. GUI components, Dialog Boxes.

Learning Resources:

1. Getting started with MATLAB "A quick introduction for scientist and engineers by Rudra Pratap, Oxford publications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt. Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Math works.
4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siauw Alexandre Bayen, Elsevier-18th April 2014.
5. https://nptel.ac.in/courses/103106118/2
6. https://www.udemy.com/numerical-methods/

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

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

INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS
(Open Elective-III)
SYLLABUS FOR B.E. V SEMESTER
(Common for CIVIL, ECE, EEE & MECH)

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code: U20OE510IT
Credits :3	CIE Marks: 40	Duration of SEE :3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
Apply the concepts of database management systems and design relational databases.	1. Understand functional components of the DBMS and develop ER model for a given problem and map ER it to Relational model 2. Understand Relational model and basic relational algebra operations. 3. Devise queries using SQL. 4. Design a normalized database schema using different normal forms. 5. Understand transaction processing and concurrency control techniques.

UNIT – I
Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Architecture, Database Users and Administrators.
Database Design and the E-R Model: Overview of the Design Process, The E-R Model, Constraints, E-R Diagrams

UNIT – II
Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Fundamental Relational-Algebra Operations.

UNIT – III
Structured Query Language: Introduction, Data Definition, Basic Structure of SQL Queries, Modification of the Database, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Join Expressions, Views.

UNIT – IV

Relational Database Design: Features of Good Relational Design, Normalization-Decomposition Using Functional Dependencies, Functional-Dependency Theory.

UNIT – V

Transactions: Transaction Concepts, Transaction State, Concurrent Executions, Serializability

Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols.

Learning Resources :

1. Abraham Silberschatz, Henry F Korth, S. Sudarshan, Database System Concepts, 6th Edition, McGraw-Hill International Edition, 2011.
2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill International Edition, 2003.
3. Elmasri, Navathe, Somayajulu and Gupta, Fundamentals of Database System, 6th Edition, Pearson Education, 2011.
4. Patric O'Neil, Elizabeth O'Neil, Database-principles, programming, and performance,Morgan Kaufmann Publishers, 2001.
5. Peter Rob, Carlos coronel, Database Systems, (2007), Thomoson.
6. https://nptel.ac.in/courses/106105175/

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 ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO STATISTICAL LEARNING
(Open Elective-III)
SYLLABUS OF B.E V- SEMESTER
(Common for CIVIL, ECE, EEE & MECH)

L:T:P(Hrs./week): 3:0:0	SEE Marks :60	Course Code : U20OE520IT
Credits :3	CIE Marks: 40	Duration of SEE :3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
The course will enable the students to apply the statistical programming concepts and techniques using Python libraries in the analysis of Statistical data.	1. Understands the basics of statistical concepts and various data types in Numpy, Pandas. 2. Cleans and Analyzes the data with descriptive statistics and EDA. 3. Visualizes the data with matplotlib, seaborn graphic libraries. 4. Analyzes data with various statistical inference techniques using Hypothesis testing. 5. Understands and applies various data distributions, sampling and simulation of random variables. 6. Applies various statistical models like linear regression, ANOVA to the data.

Unit I: Introduction to Statistical computing and Python libraries
Intro to statistics: Samples and Population, Descriptive statistics; intro to Computational statistics, Data analysis, knowledge discovery in Data, Various data types.
Intro to statistical computing software: Python libraries & R.

Unit II: Data Collection, Cleaning and Exploratory Data Analysis using Pandas.
Data types in Numpy, Pandas: list, vector, matrix, array, tensor, DataFrame. Operations on Data Types.
Data import using Pandas, Data cleaning, imputation, EDA case studies using Pandas.

Unit III: Data Visualization with matplotlib and Seaborn.
Intro to matplotlib and Seaborn graphic libraries, basic visualizations using matplotlib, Advanced visualizations with Seaborn, Data correlation chart. Case studies on visualizations.

Unit IV: Data distributions, Statistical Inference using Hypothesis testing.
Understanding various data distributions: Bernoulli, Binomial, Exponential, Poisson & Gaussian.
Intro to Hypothesis testing: p-value, critical value, interpretation of test results.
Types of Hypothesis testing using Scipy.stats: Normality tests, Correlation tests, Comparing samples.

Unit V: Simulations and Statistical models
Random variables, sampling and simulation of data distributions.
Statistical models: Linear algebra, Optimizations, Linear regression, Intro to Statistical or Machine learning.

Learning Resources:

1. https://machinelearningmastery.com/statistics_for_machine_learning/
2. https://scipy-lectures.org/packages/statistics/index.html
3. Udemy: Python for Statistical Analysis
4. courseera: Statistics with Python specialization
5. https://numpy.org/
6. https://pandas.pydata.org/
7. https://matplotlib.org/
8. https://seaborn.pydata.org/
9. https://www.statsmodels.org/stable/index.html
10. https://scikit-learn.org/stable/
11. A first Course in Statistical Programming with R, W. John Braun, Duncan J. Murdoch, Cambridge University Press, 2007.
12. https://cran.r-project.org/manuals.htm

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 ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

DESIGN THINKING

(Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 3Hours	SEE Marks : 60	Course Code : U20OE510EH
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. Understand the critical design thinking skills needed to either improve an existing product or thinking design a new product. 2. Learn to identify customer needs and draft customer needs statements as your first step toward user innovations. 3. Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help to define those specifications. 4. Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions. 5. Learn to select and implement a product development process that's aligned with your project needs. Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications.	On completion of the course, the student will be able to: 1. Learn the concepts that drive design thinking. 2. Submit project ideas around user Innovations. 3. Identify prospective customer needs and user groups. 4. Translate needs into product specifications 5. Build out the product architecture, Create a prototype and present the prototype.

Unit 1: Design Thinking Skills

Understand the critical design thinking skills needed to either improve an existing product or design a new product.

1.1 The Need for Design Thinking

1.2 What makes design thinking unique?

1.3 Design thinking checklist

Unit 2: Identifying Customer Needs

Learn to identify customer needs and draft customer needs statements as your first step towards user innovations.

2.1 Think Users' First

2.2 Users' inherent needs
2.3 Empathy and Design Thinking
2.4 Asking the Right Questions
2.5 Persona Empathy map

Unit 3: Product Specifications
Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help define those specifications
3.1 Creating a Design Brief Template
3.2 Stakeholder map template
3.3 Customer journey template
3.4 Context map template
3.5 Opportunity map template

Unit 4: Applied Creativity
Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions.
4.1 The need to ideate
4.2 The Rules of ideation
4.3 Participating in an ideation session
4.4 Building a Creative Culture
4.5 Divergent—5 common ideation techniques

Unit 5: Product Development Processes and Prototyping
Learn to select and implement a product development process that's aligned to your project needs. Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications.
5.1 The need for a prototype
5.2 The Need to Test and how to conduct a structured test
5.3 How to conduct the observers' debrief

METHODOLOGY

- Case Studies
- Demonstration
- Presentations
- Expert lectures
- Writing and Audio-visual lessons

ASSESSMENTS

- Online assignments
- Individual and Group

Suggested Books

The Art of Innovation, by Tom Kelley*
Insight Out, by Tina Seelig*
Change by Design, Tim Brown
Weird Ideas That Work, by Robert Sutton*
Wired to Care, by Dev Patnaik
Rapid Viz, by Kurt Hanks and Larry Belliston

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: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

TECHNICAL WRITING AND PROFESSIONAL PRESENTATIONS

(Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 3Hours	SEE Marks : 60	Course Code : U20OE520EH
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. Understand the principles and mechanics of technical writing for students of engineering. 2. Identify different kinds of business correspondences and the dos and don'ts for each of them. 3. Make effective presentations as part of today's workplace demands. 4. Recognize the need for Video and Written CVs with focus on specific elements. 5. Comprehend skills associated with technical writing and understand different papers ranging from process description and feasibility reports to research projects, project proposals, and SOPs	On completion of the course, the student will be able to: 1. Write effective reports. 2. Articulate business correspondences based on need. 3. Make persuasive presentations. 4. Design their videos CVs. 5. Write papers ranging from process description and feasibility reports to research projects, project proposals, and statement of purpose

UNIT 1: FORMAL & INFORMAL TECHNICAL REPORTS

1.1 Informal Report Formats
1.2 Project and Research Reports
1.3 Formal Report Components, Feasibility Reports, Evaluation reports
1.4 Analytical and Informational reports
1.5 Executive summaries.

UNIT 2: BUSINESS CORRESPONDENCE

2.1 Electronic communication
2.2 Effective emails
2.3 Instant and text messaging guidelines

UNIT 3: PROFESSIONAL PRESENTATIONS

3.1 Paper presentations & Poster presentations
3.2 PowerPoint presentations
3.3 Storyboard writing

UNIT 4: RESUME & CVs

4.1 Technical Resume
4.2 Cover letter, resume format
4.3 Video CVs

UNIT 5: WRITING PROPOSALS & SOPs

5.1 Types of proposals
5.2 Request for proposals
5.3 Stating your objective.

METHODOLOGY

- Case Studies
- Demonstration
- Presentations
- Expert lectures
- Writing and Audio-visual lessons

ASSESSMENTS

- Online assignments
- Individual and Group

LEARNING RESOURCES

learn.talentsprint.com

1. Read Me First!: A Style Guide for the Computer Industry by Sun Technical Publications
2. Eats, Shoots and Leaves Paperback – 18 February 2010 by Lynne Truss
3. Don't Make Me Think, Revisited: A Common Sense Approach to Web & Mobile Usability | Third Edition | By Pearson Paperback –
4. The Design of Everyday Things: Revised and Expanded Edition Paperback –Illustrated, 5 November 2013 by Don Norman (Author

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: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

BASICS OF ENTREPRENEURSHIP

(Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 3Hours	SEE Marks : 60	Course Code : U20OE530EH
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. Deeply understand and discover entrepreneurship 2. Build a strong foundation for the students to start, build, and grow a viable and sustainable venture 3. Develop an entrepreneurial mind-set equipped with the critical skills and knowledge required	On completion of the course the student will be able to: 1. Take-up entrepreneurship as a career choice 2. Create and Validate business models. Build a Minimum Viable Product (MVP). 3. Identify various costs and revenue streams for a venture. 4. Build successful teams and acquire sales skills. 5. Understand the business regulations and various Government schemes available..

UNIT-I

Introduction to Entrepreneurship: Definition of Entrepreneurship, Entrepreneurship as a career choice, Benefits and Myths of Entrepreneurship; Characteristics, Qualities and Skills of an Entrepreneur. Impact of entrepreneurship on the Economy and Society.

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

UNIT-II

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

UNIT-III

Economics and Financial Analysis: Revenue streams and pricing, Income analysis and Cost Analysis-Product Cost and Operation Cost, Basics of Unit

Costing, Profit Analysis, Customer Value Analysis, Different Pricing Strategies, Investors' Expectations, Pitching to Investors and Corporate.

UNIT-IV

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

UNIT-V

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

Learning Resources:

1. Robert D. Hisrich, Michael P Peters, "Entrepreneurship", Sixth edition, McGraw-Hill Education.
2. Thomas W. Zimmerer, Norman M. Scarborough, "Essentials of Entrepreneurship and small business Management", Fourth edition, Pearson, New Delhi, 2006.
3. Alfred E. Osborne, "Entrepreneurs Toolkit", Harvard Business Essentials, HBS Press, USA, 2005
4. Madhurima Lall and Shikha Sahai, "Entrepreneurship", Excel Books, First Edition, New Delhi,2006

Web Resource: http://www.learnwise.org

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: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

SKILL DEVELOPMENT COURSE-V (Communication Skills-II)

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 1 Hours	SEE Marks : 40	Course Code : U20HS510EH
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. Get students proficient in both receptive and productive skills 2. Enable students to build strategies for effective group interaction and help them in developing decisive awareness and personality while maintaining emotional balance. 3. To introduce students to an ideal structure for a presentation 4. To develop and improve writing and study skills needed for college work	On completion of the course, the student will be able to: 1. Participate in group and forum discussions by providing factual information, possible solutions, and examples 2. Present a topic by picking up the key points from the arguments placed. 3. Read between the lines and write informed opinions. 4. Prepare, present, and analyze reports

Unit 1: Delightful Discussions

1.1 Six Thinking Hats
1.2 Group Discussion Techniques (Initiation Techniques, Generating Points, Summarization techniques)
1.3 Case Study Based Group Discussions

Unit 2: Powerful Presentations

Concise Cogent Presentation
2.1 Persuasion skills
2.2 Toulmin Model
2.3 BikerB - JAM and Extempore

Unit 3: Fact, Observation and Inference

3.1 Discernment of fact and opinion
3.2 Note making and Inference
3.3 Main idea identification
3.4 Logical Conclusions

Unit 4: Effective Technical Writing

a. Report writing
b. Image Writing
c. Book Reviews
d. Movie Reviews

Learning Resources:

1. How to Win Friends and Influence People by Dale Carnegie. ...
2. Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler. ...
3. Difficult Conversations: How to Have Conversations that Matter the Most by Douglas Stone, Bruce Patton, Sheila Heen, and Roger Fisher.

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

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3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 60 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

SKILL DEVELOPMENT-VI (Technical Skill-II)

Mathematical Programming

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 1 Hours	SEE Marks : 40	Course Code : U20PE510ME
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

Course objectives	Course Outcomes
The objectives of this course are to: formulate script/function files using Mathematical programming tools and develop programs for solving various problems including polynomial and differential equations.	On completion of the course, the student will be able to: 1. utilise Mathematical programming tool, e.g, MATLAB, Mathematica for mathematical operations using built-in functions. 2. formulate matrices and understand matrix operations. 3. Create and execute script/function files and understand graphical representation using 2-D plots. 4. develop programs using conditional statements. 5. solve differential equations.

UNIT –I

Introduction to mathematical programming tools, e.g, MATLAB/OCTAVE/Mathematica. Working in Command Windows, Mathematical Arithmetic operations with scalars, order of preference.

Working as a calculator, Display of formats, Elementary Math-building functions, Example Problems.

Assignment operators, rules about variables.

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.

Creating a function file, running function file. Feval command, examples and mathematical applications.

2D plots, Plots with special graphics, Multiple plots, examples.

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 and 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
5. The Mathematica Book, Fifth Edition, Wolfram Media

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

1	No. of Internal Tests:	01	Max.Marks for each Internal Test:	30
2	No. of Assignments:	--	Max. Marks for each Assignment:	--
3	No. of Quizzes:	--	Max. Marks for each Quiz Test:	--

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

HUMAN VALUES AND PFOFESSIONAL ETHICS-II

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 1 Hours	SEE Marks : 40	Course Code : U20HS010EH
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. Create an awareness on the interrelation between Society, Ethics and Human Values 2. Understand how ethical dilemmas apply to real life scenarios 3. Develop ethical human conduct and professional competence 4. Understand the role of good ethical practices and apply it in a project	On completion of the course, the student will be able to: 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 behavior 2. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, and the objective presentation of data. 3. Assess their own ethical values and the social context of problems and articulate what makes a particular course of action ethically defensible 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

UNIT1 - 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:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 60 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

CAD/CAM LAB

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: **U20PC531ME**
Credits :01	CIE Marks:30	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*
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: 3 Hours			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

MANUFACTURING PROCESSES LAB

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week): 0:0:2	SEE Marks:50	Course Code: U20PC541ME
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: 3 Hours			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

Programming for Mechanical Engineers Lab

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: U20PC551ME
Credits :01	CIE Marks: 30	Duration of SEE: 03 Hours

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 for a 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. Program to find bending moment and shear force for the given load conditions.
7. Program to study of impact of free jet on different vanes
8. Write a program to find position, velocity, and acceleration for a slider crank mechanism
9. Program to find the diameter of the shaft for the given load conditions.
10. Program to design of Knuckle joint
11. Program to design of Cotter joint
12. Program to study of flow behaviour through a pipe
13. Program to generate spline curves.
14. Gauss elimination program
15. Program for Thomas algorithm
16. Simpson's 1/3 rule & Simpson's 3/8 rule program.

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: 3 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-20)
B.E. – MECH : SIXTH SEMESTER (2022-2023)

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								
U20PC620ME	Metrology and Instrumentation	3	-	-	3	60	40	3
U20PC630ME	Machine Design	3	-	-	3	60	40	3
U20PC640ME	Metal Cutting and Machine Tools	3	-	-	3	60	40	3
U20PE6xxME	Professional Elective - I	3	-	-	3	60	40	3
U20OE6XXXX	Open Elective-IV	3	-	-	3	60	40	3
U20HS610EH	Skill Development-VII (Aptitude-III)	1	-	-	2	40	30	1
U20PE610ME	Skill Development-VIII (Technical Skills-III)	1	-	-	2	40	30	1
U20MC010CE	Environmental Science	2	-	-	3	60	40	0
PRACTICALS								
U20PC621ME	Dynamics and Metrology Lab	-	-	2	3	50	30	1
U20PC641ME	Machine Tools Lab	-	-	2	3	50	30	1
U20PW619ME	Theme Based Project	-	-	2	-	50	30	1
TOTAL		**19**	**-**	**6**		**590**	**390**	**20**
GRAND TOTAL		**25**				**980**		**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-20)

		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	U20PE6610ME	Vibration Analysis and Noise Control	U20PE6620ME	Production Drawing	U20PE6630ME	Advanced Fluid Mechanics	U20PE6640ME	Operations Research	U20PE6650ME	Automotive Chassis Components

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

METROLOGY AND INSTRUMENTATION

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U20PC620ME
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES *The objective of this course is*	**COURSE OUTCOMES** *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

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: 90 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: U20PC630ME
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 condition. 2 design helical and leaf springs under direct and eccentric loading for various applications. 3 design gears under strength and wear conditions for power transmission. 4 design sliding contact bearings for supporting shafts/axles under radial and thrust loads. design rolling contact bearings for supporting shafts /axles under static and dynamic loads. 5 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

Materials used for gear design. 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 and 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

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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: **90 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: U20PC640ME
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 principle process 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: 90 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: U20PE610ME
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 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

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

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Duration of Internal Test: 90 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: U20PE620ME
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*
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 drawing, materials and symbols to implement them later in Production drawings. 2 understand limits, fits and tolerances to indicate them on drawings to get suitable fits after assembly. 3 understand the need for surface roughness between surfaces in contact to select suitable manufacturing process. 4 prepare the process sheet for various components to show the sequence of manufacturing processes, machines to be used with work holding details. 5 prepare production drawings for parts of various assemblies indicating all conventions required for manufacturing.

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

ADVANCED FLUID MECHANICS (PE-I)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week): 3:0:0	SEE Marks:60	Course Code: **U20PE630ME**
Credits : 03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of this course are to: • evaluate control volume analysis to develop basic equations and to solve problems. • describe and use differential equations to determine pressure and velocity variations in internal and external flows. • examine the concept of viscosity and where viscosity is important in real flows.	On completion of the course the student will be able to: • use the governing equations of fluid flow and applying them to flow problems. • explain the mathematical formulation of internal and external flow problems. • analyze the boundary layer concept to the fluid flow problems. • inspect the physics of turbulence and turbulent fluid models applied to specific flow conditions • apply the basic principles to derive the equation for viscous flow, including laminar flow & turbulent flow.

UNIT – I: Inviscid Flow of Incompressible Fluids: Lagrangian and Eulerain Descriptions of fluid motion- Path lines, Stream lines, Streak lines, stream tubes – velocity of a fluid particle, types of flows – Stream and Velocity potential functions. Basic Laws of fluid Flow: Potential flow, Condition for irrotationality, circulation & vorticity Accelerations in Cartesian systems normal and tangential accelerations, Euler's, Bernouli equations.

UNIT – II: Viscous Flow: Equation of Fluid flow - Continuity & Momentum equation. Derivation of Navier - Stoke's Equations for viscous compressible flow – Exact solutions to certain simple cases: Plain Poiseuille flow – Coutte flow with and without pressure gradient – Hagen Poiseuille flow.

UNIT III: Boundary Layer Concepts: External Flow-Prandtl's contribution to real fluid flows –Blasius solution - Prandtl's boundary layer theory – Boundary layer thickness for flow over a flat plate – Approximate solutions – Von-Karman momentum integral equation for laminar boundary layer.

UNIT IV: Internal Flow: Boundary layer development-Hydrodynamic entry length-Smooth and rough boundaries – Equations for Velocity Distribution and frictional Resistance in smooth rough Pipes – Roughness of Commercial Pipes – Moody's diagram.

UINT V: Introduction to Turbulent Flow: Introduction to Turbulent Flow: Fundamental concept of turbulence – Time Averaged Equations – Boundary Layer Equations – Prandtl Mixing Length Model – Universal Velocity Distribution Law: Van Driest Model –Approximate solutions for drag coefficients –– k - epsilon Turbulence Model.

Learning Resources:

1. Fluid Mechanics- Frank M. White-Mc Graw Hill, 8th Edition
2. Hydraulics & Fluid Mechanics, Dr. P.N.Modi, S.M.Seth, Rajson's Publications Private Ltd.
3. Fluid Mechanics – Jog – Cambridge
4. Fluid Mechanics-Munson-Wiley
5. Fluid Mechanics-Streeter, Wylie, Bedford
6. Boundary Layer Theory/ Schlichting H /Springer Publications
7. Fluid Mechanics and Machinery/ D. Rama Durgaiah/New Age Publications
8. Fluid Dynamics/ William F. Hughes & John A. Brighton/TMH
9. Fluid Mechanics with Engineering Applications – Finnemore & Franzini – McGraw Hill

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

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

Duration of Internal Test: 90 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: U20PE640ME
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

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Duration of Internal Test: 90 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: U20PE650ME
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 understand 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. Types of clutches, torque converter, manual and automatic transmission system.

UNIT-III: DRIVE LINE

Effect of driving thrust and torque reactions, Hotchkiss drive, torque tube drive and radius rods. Propeller shaft, universal joints, front wheel drive, different

types of final drive, double reduction and twin speed final drives. 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, 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

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Duration of Internal Test: 90 Minutes

B.E. VI SEM OPEN ELECTIVE-IV COURSES			
Dept.	**Course Name**	**Code No.**	**Credits**
MECH.	Additive Manufacturing and its Applications	U20OE610ME	3
	Alternative Fuels and Energy Systems	U20OE620ME	3
	Industrial Administration and Financial Management	U20OE630ME	3
Civil	Project Management	U20OE610CE	3
EEE	Electrical Installation and Safety	U20OE610EE	3
ECE	Internet of Things and Applications	U20OE610EC	3
	Introduction to Mobile Communications	U20OE620EC	3
IT	Introduction to Web Application Development	U19OE610IT	3
	Introduction to Machine Learning	U19OE620IT	3
HSS	Critical Reasoning	U20OE510EH	3

VASAVI COLLEGE OF ENGINEEING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

Additive Manufacturing and its Applications

(Open Elective-IV)

SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U20OE610ME
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: 6. Understand the fundamentals of prototyping and the various data formats used in Additive Manufacturing. 7. Study the principle, process, advantages, limitations and case studies of liquid based AM systems. 8. Study the principle, process, advantages, limitations and case studies of solid based AM systems. 9. Study the principle, process, advantages, limitations and case studies of powder based AM systems. 10. 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.

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

Alternative Fuels and Energy Systems (Open Elective-IV)

SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U20OE620ME
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

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: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

Industrial Administration and Financial Management

(Open Elective-IV)

SYLLABUS FOR B.E VI Semester

Instruction: 3 Hrs / week	SEE Marks:60	Course Code : U20OE630ME
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

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: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

Ibrahimbagh, Hyderbad-500031

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: U20OE610CE
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES The objectives of this course are to:	**COURSE OUTCOMES** On completion of the course, students will be able 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

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. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2009
3. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 2006.
4. 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 Test	:	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 Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ELECTRICAL INSTALLATION AND SAFETY
Open Elective-IV
SYLLABUS FOR B.E. VI SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U20OE610EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES The course will enable the students to:	**COURSE OUTCOMES** On completion of the course, students will be able to
Have a fair knowledge about the fundamentals of wiring systems, electrical safety procedures, Estimation of lighting & Power loads.	1. Identify and choose the proper type wiring for domestic & industrial applications. 2. Identify and choose the proper type wiring Accessories for domestic & industrial applications. 3. Apply and implement the Electrical safety procedures for repairs & hazards. 4. Design and Estimate the domestic lighting installation. 5. Design and Draw the wiring layout for a big office building, electrical laboratory, big industry and big hotel with lift arrangement

Unit – I
Wiring Systems: Introduction, size of wires, standard wires, types of wires, CTC, PVC, Lead sheathed VIR, weather proof wires, flexible wires different types of cable wires – Types and Installation of House Wiring Systems or Methods of installing wiring.

Unit – II
Wiring Accessories: - Clips, screws -round blocks switch boards, sockets socket pins - CTS wiring - Installation of surface conduit wiring.Rigid conduits, flexible conduits – Conduit accessories - elbows bushings - reducers, conduit box saddles, PVC conduit wiring - Concealed wiring.

Unit – III
Safety Procedures: Distribution fuse boards - Main switches – Different types of fuses and fuse carriers, MCB, ELCB & MCCB. Safety procedures – Electric shock and first aid, causes for fire hazards in Electrical installations

Unit – IV

Estimation of Lighting: Estimation of domestic lighting installation service main - types of wire - specification - quantity of materials required for service main – estimation and selection of interior wiring system suitable to a given building - number of circuits - quantity of accessories required - estimates of materials for execution of the domestic wiring installation as per National Electrical act 2003.

Unit- V

Estimation of power loads: Power wiring installation - Drawing wiring layout for a big office building, electrical laboratory, big industry, big hotel with lift arrangement and a residential building with 2 bed room house.- estimation upto 20 kVA calculation of load current based on ratings of various equipment's to be installed - size of wire.

Suggested Books:

1. J.B.Gupta –A course in Electrical installation Estimating & costing-9th edition 2014, S.K.Kataria& Sons.
2. S.L.Uppal-Electrical Wiring ,Estimating& costing Electrical wiring.

Reference Books:

1. Balbir Singh-Electrical Drawing
2. Arora -Electrical wiring
3. BVS Rao -Maintenance and Operation of Electrical Equipment –Vol-I-TMH
4. S.Rao -Testing, Commissioning Operation & Maintenance of Electrical equipment -TMH
5. CRDargar -Electrical Installation design and drawing -New Asian publishers.

Online resources:

1. http://ocw.tufts.edu
2. http://ocw.upm.es
3. www.open.edu/openlearn/
4. 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 Test	:	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 ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Internet of Things and Applications (Open Elective)

SYLLABUS FOR B.E. VI - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U20OE610EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. The purpose of this course is to impart knowledge on IoT Architecture, practical constrains. 2. To study various protocols And to study their implementations	On completion of the course, students will be able to 1. Understand the Architectural Overview of IoT 2. Enumerate the need and the challenges in Real World Design Constraints 3. Compare various IoT Protocols. 4. Build basic IoT applications using Raspberry Pi. 5. Understand IoT usage in various applications.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1												1	1
CO2	3	2					1					1	1	2	2
CO3	3	1												1	1
CO4	3	1			2								1	1	1
CO5	3	2		1		2	2		2			2		2	2

UNIT - I : OVERVIEW

Introduction to IoT – Improving Quality of life.

IoT-An Architectural Overview, M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT.

UNIT - II : Real-World Design Constraints

Real-World Design Constraints- Introduction, Technical Design constraints- hardware is popular again, Data representation and visualization, Interaction and remote control. Power Management in IoT device, Power conditioning using energy harvesting.

UNIT - III : IOT PROTOCOLS

Introduction to MQTT, Quality of services in MQTT,standards and security in MQTT.

Introduction and implementation of AMQP, Implementation of CoAP and MDNS.

UNIT - IV : Device for IoT

Choice of Microcontroller, Introduction to Raspberry Pi ,Features of Pi, Programming platform, Phython programming for Pi. Building basic IoT Applications using Raspberry Pi.

UNIT - V : IoT case studies

Smart Cities and Smart Homes, Connected Vehicles, Agriculture, Healthcare, Activity Monitoring.

Learning Resources:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications
5. https://nptel.ac.in/courses/106105166/5
6. https://nptel.ac.in/courses/108108098/4

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

1.	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	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 ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Mobile Communications (Open Elective)
SYLLABUS FOR B.E. VI - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U20OE620EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the technology trends changing from generation to generation. 2. To have an insight into the various propagation models and the effects of fading. 3. To understand the multiple access techniques and Mobile communication system specifications.	On completion of the course, students will be able to 1. Analyze various methodologies to improve the cellular capacity. 2. Identify various Propagation effects. 3. Identify the effects of fading and multi path propagation. 4. Categorize various multiple access techniques for Mobile Communications. 5. Analyze the specifications of GSM based Mobile Communication Systems.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	1	1								3	
CO2	3	2	2	2		1								3	
CO3	3	2				1								3	
CO4	3	2	2	2	1	1								3	
CO5	3	2		2	1	1								3	

UNIT - I:

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communications, Examples of Wireless Communications Systems, Trends in Cellular Radio and Personal Communication Systems.

The Cellular Concept – System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems.

UNIT - II:

Mobile Radio Propagation - Large Scale Path Loss: Introduction to Radio wave Propagation, Free Space Propagation Model, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering.

UNIT - III:

Mobile Radio Propagation - Small Scale Fading and Multipath: Small Scale Multipath Propagation, Small – Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions.

UNIT -IV:

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Space Division Multiple Access (SDMA).

UNIT -V:

Wireless Systems and Standards: Global System for Mobile (GSM) – Services and features, System architecture, GSM Radio subsystem, channel types, Frame structure for GSM.

Learning Resources:

1. Theodore S. Rappaport, Wireless Communications Principles and Practices, 2nd edition, Pearson Education.
2. David Tse, Pramodh Viswanath, Fundamentals of Wireless Communication, 2005, Cambridge University Press.
3. Name of the course: Introduction to Wireless and Cellular Communications
   Course url: https://swayam.gov.in/nd1_noc19_ee48/preview

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

1.	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	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 ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO WEB APPLICATION DEVELOPMENT

(OPEN ELECTIVE-V) (Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E VI- SEMESTER

L:T:P(Hrs./week): 3:0:0	SEE Marks : 60	Course Code : U20OE610IT
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES *On completion of the course, students will be able to*
Acquire basic skills for designing static and dynamic Web Applications using HTML, CSS , Java script and PHP.	1. Design a static web pages using HTML, CSS. 2. Use JavaScript for creating dynamic web pages and client side validation. 3. Use built-in functions of PHP to perform server side validations and sending emails. 4. Use built-in functions of PHP to connect , query and fetch results from a database. 5. Build a PHP application using an MVC Framework.

UNIT-I: Introduction

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

UNIT-II: Basics of JavaScript

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

UNIT-III: Basics of PHP

Basics of PHP: Data Types, Variables and Operators, Control Structures: If else, Switch Case. Loop: For, ForEach, While, Do While. Functions in PHP, PHP Forms, Cookies & Sessions, File Processing.

UNIT-IV: Advanced PHP

Advanced PHP: PHP E-Mail, Filters, Database Access, OOPS in PHP. Application using PHP.

UNIT-V: Introduction to MVC

Introduction to Model View Controller Architecture, Building Application using a PHP Framework, Testing and Deploying a PHP application.

Learning Resources:

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

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 ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO MACHINE LEARNING

(OPEN ELECTIVE-V) (Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E VI- SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks :60	Course Code: U20OE620IT
Credits : 3	CIE Marks: 40	Duration of SEE :3Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
	On completion of the course, students will be able to
Introduce the fundamental concepts and approaches in Artificial intelligence and Machine Learning field to effectively apply techniques to the real-world problems.	1. Demonstrate knowledge of the Artificial intelligence and machine learning literature. 2. Apply an appropriate algorithm for a given problem. 3. Apply machine learning techniques in the design of computer systems. 4. Prove basic results in the theory of learning 5. Explain the relative strengths and weaknesses of different machine learning methods and approaches.

UNIT-I:

Introduction to AIML: Foundations of AI, Sub areas of AI, Applications. Introduction to learning, Types of Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning.

Supervised learning: Linear Regression, Logistic Regression.

UNIT-II:

Supervised Non-parametric learning: Introduction to Decision Trees, K-Nearest Neighbor, Feature Selection.

Supervised Parametric learning: Support Vector Machine, Kernel function and Kernel SVM.

UNIT-III:

Supervised Parametric learning (Neural networks): Perceptron, Multilayer Neural Network, Backpropagation.

UNIT-IV:

Supervised Parametric Bayesian learning: Introduction, Naive Bayes Classification, Bayesian Network.

UNIT-V:

Unsupervised leaning: Clustering, K-means Clustering, DBSCAN

Learning Resources:

1. Tom Mitchell, Machine Learning, First Edition, McGraw-Hill, 1997
2. Christopher Bishop. Pattern Recognition and Machine Learning. Second Edition.
3. EthemAlpaydin , Introduction to Machine Learning, Second Edition
4. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008.
5. http://nptel.ac.in/courses/106106139/

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 ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Critical Reasoning (Open Elective-IV)
SYLLABUS FOR B.E. VI - SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U20OE510EH
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Identify the alternative solutions to the problem or case. 2. Derive solution or discuss the best solution(s) to the problem or case. 3. Discuss the conclusions that follow from the solution(s). Students will be trained to apply concepts like percentages and averages to solve complex problems. 4. Students will be trained to use effective methods like elimination of options and shortcuts to solve problem accurately. 5. Students will be trained to use effective methods like decision making and shortcuts to solve problems accurately.	**At the end of the course the learners will be able to: -** 1. Analyse and use techniques for Venn diagrams to solve questions effectively. 2. Demonstrate the difference between deductive and inductive reasoning. 3. Evaluate and distinguish between strong and weak assumption and conclusions. 4. Evaluate a select the right arguments from the given statements. 5. Evaluate and choose the right decision for the given situation

Unit- 1 Analyzing Datasets & Puzzles with Analytical Thinking
1.1 Set Theory/Data Sets/Venn Diagrams
1.2 Analogy
1.3 Classifications

Unit- 2 Logical Reasons & Logical Deductions
2.1 Analytical Puzzles
2.2 Logical Data Sequences
2.3 Logical Fact Deductions
2.4 Assertions & Reasons

Unit- 3 Essentials, Reactions, Causes & Data Adequacies/Inadequacies
3.1 Essential Part/Verification of Truth of Statements
3.2 Situation Reaction Test

3.3 Cause & Effect
3.4 Data Sufficiency

Unit- 4 Statements, Assumptions, Arguments & Conclusions

4.1 Statements & Assumptions
4.2 Statements & Arguments/Inferences/Analyzing Arguments
4.3 Statements & Conclusions
4.4 Analytical Reasoning

Unit- 5 Evaluations, Decisions & Making Judgements

5.1 Decision Making
5.2 Making Judgements
5.3 Evaluating Course of Action

Prescribed textbook for theory:

1. A Modern Approach to Verbal & Non-Verbal Reasoning S.CHAND by Dr. R S Aggarwal

Suggested Reading

1. Learn.talentsprint.com/References Courses
2. LOGICAL Reasoning Disha Publications

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

1.	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	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 ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development -VII (Aptitude-III)
SYLLABUS FOR B.E. VI - SEMESTER

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 40	Course Code: U20HS610EH
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Introduce students to higher order thinking and problem solving via vocabulary and its various components 2. Train students to understand context & theme and use it to complete sentences. 3. Train students to identify the structure of sentences & paragraphs 4. Train students to analyze text, e.g., simple outlining and note taking, summarize, draw conclusions, and apply information to personal experiences 5. Train students to improve the quality of sentences by fixing errors	**At the end of the course the learners will be able to: -** 1. Use vocabulary as a tool to solve questions in verbal ability 2. Identify meanings of words using theme and context 3. Solve questions based on jumbles-sentences and paragraphs 4. Develop skills to critically analyze texts and then the ability to identify its theme 5. Improve the quality of their writing by being aware of the common errors

Unit 1: 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.

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 2: 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.

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

Unit 3: 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.

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

Unit 4: 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.

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.

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

METHODOLOGY

- Demonstration
- Presentations
- Expert lectures
- Writing and Audio-visual lessons

ASSESSMENTS

- Online assignments
- Individual and Group

Learning Resources:

learn.talentsprint.com

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

1.	No. of Internal Tests	: 2	Max. Marks for each Internal Test	:	20
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

SKILL DEVELOPMENT-VIII (TECHNICAL SKILLS-III)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: U20PE610ME
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: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

ENVIRONMENTAL SCIENCE

SYLLABUS FOR B.E. VI-SEMESTER

L: T: P (Hrs/Week):2:0:0	SEE Marks:60	Course Code:U20MC010CE
Credits : - - -	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, classification of ecosystems, aquatic ecosystem (ponds) ,Terrestrial ecosystem(Forest)

UNIT-III: Biodiversity: Genetic, species and ecosystem diversity. Values of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity. Biological diversity Act 2002

UNIT-IV: Environmental Pollution: Causes, effects and control measures of air pollution, air pollution control devices(catalytic convertor) water pollution, water pollution monitoring devices, soil pollution, noise pollution,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. Consumerism, Sustainable development goals (SDG-17),Environmental protection act 1986.

Learning Resources:

1. Deswal S. and Deswal A., A Basic Course on Environmental studies, Dhanpat Rai & Co Pvt. Ltd. 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2006.
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. Sharma V.K., Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 2013.
7. Rajagopalan R., Environmental Studies, Second Edition, Oxford University Press, 2013.

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

DYNAMICS AND METROLOGY LAB

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:50	Course Code: U20PC621ME
Credits :01	CIE Marks:30	Duration of SEE: 03 Hours

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 2 rotating masses in different planes. determine the vibration response of free and 3 forced vibrating systems. make use of the inspection gauges and various measuring instruments for 4 applications such as measuring angles of a single point cutting tool and parameters of screw thread. 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
9 To study the high strain rate mechanical properties of aluminum specimen using SPHB apparatus.

METROLOGY LAB

10 To conduct linear& surface roughness measurements.
11 To calibrate the various thermo couples and LVDT
12 To perform the design of snap gauge.
13 To find the chordal thickness of a gear tooth using Gear tooth vernier
14 To determine the depth and diameter of bore present in a component using bore gauge.
15 Determination of Tool Angles using Profile Projector
16 Displacement measurement using linear variable differential transducer (L.V.D.T.)
17 To make alignment tests 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

MACHINE TOOLS LAB

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: U20PC641ME
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: 50	Course Code: U20PW619ME
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 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.

The department will appoint a project coordinator who will be in-charge of the following.

- The theme-based project can be assigned on individual basis or to a group consisting of maximum three students per batch.
- Allotment of project guide
- Project progress monitoring as per the time table

All the projects are to be monitored through progress seminars at least twice in a semester. CIE marks (30 marks) are based on the performance of the two presentations given by the student batches through evaluation rubrics.

The SEE marks (50 marks) are awarded by an external examiner based on a viva-voce exam.

Norms of final documentation of the project report will be provided by the Department.

No. of Presentations for CIE marks	2	Max. Marks for each CIE presentation:	15
Marks are awarded based on technical content, Tools and Technology, presentation skills, subject knowledge and discussion using rubrics.			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-20)
B.E. (ME) Honours Degree Program in Robotics
(2022-2024)

B.E (ME) Honours Degree in Robotics								
S. No.	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P		SEE	CIE	
THEORY CUM PRACTICALS								
V-Semester AY 2022-23								
U20PC560ME	Industrial Robotics	3	-	-	3	60	40	3
U20PC570ME	Control Engineering	3	-	-	3	60	40	3
VI-Semester AY 2022-23								
U20PC660ME	Industry 4.O	3	-	-	3	60	40	3
VII-Semester AY 2023-24								
U20PC760ME	Robotics and Control	3	-	-	3	60	40	3
U20PC770ME	Robotics Lab	-	-	2	-	50	30	1
	TOTAL	**12**	**0**	**2**		**290**	**190**	**13**
	GRAND TOTAL	**14**				**480**		**13**
1. MOOCs Course (Robotics related): 12 weeks durations (V or VI - Semester)								3
2. Course Project (VI or VII -Semester)								3
							Total Credits:	**19**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

INDUSTRIAL ROBOTICS

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 3 Hrs /week	SEE Marks : 60	Course Code : U20PC560ME
Credits : 3	CIE Marks: : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE **The objective of the course is to**	**COURSE OUTCOMES** **On completion of the course, students will be able to**
study industrial robot components, configuration, sensors, drives, applications and programming through experiential learning.	1 explain configuration of industrial robots and summarize various applications. 2 interpret various elements of the industrial robots 3 Develop methodology to represent position and orientation of industrial robot links in spatial coordinate system. 4 classify various sensors used in industrial robots for suitable purpose. 5 Outline the interface between the human user and an industrial robot using various programming languages.

UNIT-I

ROBOT BASICS

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

Robot configurations-cartesian, cylindrical, polar, articulated and SCARA. Parallel robots

ROBOT APPLICATIONS

Application in industry – material handling, loading & unloading, processing, welding & painting, assembly and inspection

HANDS ON EXPERIENCE:

Modelling and assembly of Robotic manipulators using CAD software.

UNIT-II

ROBOT ELEMENTS

End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot joints types, Robot drive system types: Electrical, pneumatic and hydraulic. Position and velocity feedback devices

HANDS ON EXPERIENCE:

Motion simulation for robotic industrial manipulators

UNIT-III

ROBOT COORDINATE SYSTEMS

Coordinate frames, Rotation matrix, Euler angles, Roll pitch and yaw angle representation, Composite rotations, Homogeneous Transformation matrix.

HANDS ON EXPERIENCE:

Homogeneous transformation using python programming

UNIT-IV

ROBOT SENSORS

Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors

Introduction to Machine Vision and Artificial Intelligence.

HANDS ON EXPERIENCE:

Demonstration of various IIOT sensors and controllers

UNIT-V

Robot programming

On line programming, teach pendant control, Lead through, Walk through, off line programming, Task programming. Robot programming exercises using MATLAB.

HANDS ON EXPERIENCE:

Virtual experimentation using Coppeliasim software

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel and Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata Mc Graw-Hill Publishing Company Limited , 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata Mc Graw Hill Publishing Company Limited, 2010.
3. Klafter R.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", Tata Mc Graw-Hill Publishing Company Limited, 2008
5. R.K. Mittal and I. J. Nagrath"Robotics and Control", Tata Mc Graw-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:	10
3	No. of Quizzes:	0	Max. Marks for each Quiz Test:	--

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

CONTROL ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 3 Hrs /week	SEE Marks : 60	Course Code : U20PC570ME
Credits : 3	CIE Marks: : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE The objective of the course is to	**COURSE OUTCOMES** On completion of the course, students will be able to
describe physical systems through mathematical models and graphical representations and assess their response and stability in frequency and time domains and design suitable control methods through experiential learning.	1. develop Transfer functions for Mechanical systems using mathematical modelling and obtain the equivalent electrical analogous systems. 2 simplify the systems given in pictorial representation and examine the steady state and transient behaviour. 3 estimate the system behaviour using Routh criterion, Root locus and Bode diagrams. 4 analyze the steady state and transient behaviour of various systems using different compensators with Root locus technique . 5 model the system in state space domain and test for controllability and observability.

UNIT-I

Control Systems Classification: Examples of control systems, Open Loop & Closed Loop Systems. Mathematical models and Transfer functions from governing equations of translatory mechanical systems. Force- Voltage and Force-Current analogy.

Hands on Experience:

Experiment on DC Position control system

Experiment on traffic control system

UNIT-II

Block diagrams, Block diagram reduction. Signal flow graphs, Mason's gain formula. Types of inputs. Time domain specifications of 2^{nd} order systems, Response of 2^{nd} order systems to Step input. Steady state error, Static Error constants.

Hands on Experience:

Experiment to find the time response of second order system

To calculate characteristics of a second order system, such as damping ratio, natural frequency, percent overshoot, settling time, rise time and peak time using mathematical programming

UNIT-III

Routh stability criteria, Root Locus method for negative feedback systems.
Frequency Response, Bode plots. Gain and Phase Margins.
Hands on Experience:
Write a mathematical program to plot the Root locus, Bode diagram of the system

UNIT-IV

Introduction to compensator design (qualitative treatment only): PID, Lead, Lag and Lag–Lead compensators design using Root locus method.
Hands on Experience:
Experiment on temperature control system
Simulate and analyze a transfer function to step input by building a PID Controller using mathematical simulation

UNIT-V

State–space representation of linear control systems. Conversion of Transfer function into State Space, Conversion of State-Space in to Transfer Function, Solution of state equations by Laplace transformation technique. Concept of Controllability and Observability.
Hands on Experience:
To transform a mathematical model of a linear time invariant system from Transfer-function to State-space and State-space to Transfer- function using mathematical programming

Learning Resources:

1. R.C. Dorf, "Modern Control Systems", Addison Wesley, 1989
2. M. Gopal, "Control Systems", Tata McGraw-Hill, 2004.
3. Ogata, K. "Modern Control Engineering", Prentice Hall, 2004
4. Norman S. Nise, "Control Systems Engineering", John Wiley & Sons, Inc., 2001.
5. William J. Palm, III, Modelling, Analysis, and Control of Dynamic Systems, John Wiley & Sons Inc., 2nd Edition, 1999.
6. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, Robotics: Modelling, Planning and Control, Springer Science & Business Media, 2008

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:	10
3	No. of Quizzes:	0	Max. Marks for each Quiz Test:	--

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

INDUSTRY 4.O

SYLLABUS FOR B.E. VI-SEMESTER

Instruction : 3 Hrs /week	SEE Marks : 60	Course Code : U20PC660ME
Credits : 3	CIE Marks: : 40	Duration of SEE : 3 Hours

UNIT – I

Introduction to Industry 4.0

Definition of Industry 4.0, Comparison of Industry 4.0 Factory and today's Factory, Difference between conventional automation and Industry 4.0.

Basic principles and technologies of a Smart Factory

Internet of Things (IoT) & Industrial Internet of Things (IIoT) & Internet of Services, Big Data, Cyber-Physical Systems, Value chains in manufacturing companies, Customization of products, Digital Twins, Cloud Computing / Cloud Manufacturing, Security issues within Industry 4.0 networks.

UNIT – II

Cyber-Physical Systems (CPS) and Cyber-Physical Production Systems (CPPS)

Definition of Cyber-Physical System, Core elements of Cyber-Physical Systems and Cyber-Physical Production Systems, Control theory and real-time requirements, Self-organization principles, Communication in cyber-physical systems, Design Methods for Cyber-physical Systems, Applications for cyber-physical systems.

Cyber-Physical Systems and new Business Models

How CPS can induce new Business Models, The Role of horizontal and vertical value streams, New Business Models for the Smart Factory, Characteristics of Business Models within the Smart Factory, Examples of new Business Models: Service provider, Data provider, Technology provider, Platform provider.

UNIT – III

Digital Twins in Production

Basic concepts of Digital Twins, Benefits, impact and challenges of Digital Twins, Features and Implementation of Digital Twins, Types of Digital Twins, Digital Twin use cases, Applications for digital twins in production.

Assistance systems for production

The connected worker within the Industry 4.0 scenario, Diversity-driven workplaces, Human-and task-centered assistance systems, Technical tools

("Ambient Assisted Working" (AAW)), Mobile information technologies, Shop floor information systems, Production line support systems, Manipulator systems and intelligent chairs, Human work support by using exoskeletons, Applications of assistance systems in production.

UNIT –IV

Human-Robot Collaboration

Human-Robot Collaboration in Industry, Collaborative Robots: tasks, examples, Types of Human-Robot Collaboration, Safety of Human-Robot Collaboration, Applications with Collaborative Robots.

Safety and Security in networked Production Environments

Definition of Safety with Industry 4.0, Safety for connected Machines and Systems, Safety in Human Robot cooperation, Optimizing Safety with Industry 4.0, Security & Security Risks with Industry 4.0.

UNIT – V

Cloud Manufacturing and the connected factory

Virtualization, Cloud Platforms, Big data in production, Cloud-based ERP and MES solutions, Connected factory applications, IT security for cloud applications.

The smart workpiece

Intelligent work piece, Work piece tagging, QR codes and RFID, Communication between work piece and environment, Multi-agent systems in production, Applications for smart work pieces.

Learning Resources:

1. Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, Apress, 2016.
2. Ibrahim Garbie, Sustainability in Manufacturing Enterprises: Concepts, Analyses and Assessments for Industry 4.0, Illustrated Edition, Springer, 2016.
3. Klaus Schwab, The Fourth Industrial Revolution, Crown, 2017.

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:	10
3	No. of Quizzes:	0	Max. Marks for each Quiz Test:	--

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

ROBOTICS AND CONTROL

SYLLABUS FOR B.E. VII-SEMESTER

Instruction : 3+1 Hrs /week	SEE Marks : 60	Course Code : U20PC760ME
Credits : 3	CIE Marks: : 40	Duration of SEE : 3 Hours

UNIT-I

Robot Kinematics

Forward Kinematics: Forward/direct kinematic analysis of serial manipulators. Inverse Kinematics: General properties of inverse kinematic solution. Inverse kinematics of serial RR planar manipulators.

UNIT-II

Differential Kinematics and Statics

Linear and angular velocity of links, Velocity propagation, Manipulator Jacobian for serial manipulators, Jacobian Singularities, Static Analysis: Force and moment balance, Jacobian in statics.

UNIT-III

Dynamics of serial manipulators

Lagrangian formulation for equations of motion for RP, RR serial manipulators, Recursive dynamics using Newton-Euler formulation of RP and RR serial manipulator.

UNIT-V

Motion and Force Control:

Decentralized Control: Independent joint control, Decentralized feed forward compensation, computed torque control

Centralized control: ID control with granty compensation

Force Control: Passive and active compliance impedance control

Force control with inner position loop, inner velocity loop, parallel force / position control.

UNIT-V

Trajectory Generation

Joint-Space Techniques: Cubic Polynomial Trajectories, Linear Segments with Parabolic Blends-without and with via points

Cartesian-Space Techniques : Straight line path, Circular Path, Position Planning, Orientation Planning.

Learning Resources:

1. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, "Robotics: Modelling, Planning and Control", Springer Science & Business Media, 2010.
2. M.W.Spong and M.Vidyasagar,"Robot Dynamics and Control", 1st Edition, John Wiley and sons,1990.
3. R.K.Mittal and I.J.Nagrath, "Robotics and Control", Tata McGraw-Hill, 2003.
4. Subir Kumar Saha, "Introduction to Robotics", Tata McGraw-Hill Education, 2014.
5. Howie M. Choset, Seth Hutchinson, Kevin M. Lynch, "Principles of Robot Motion: Theory, Algorithms, and Implementation", MIT Press, 2005.

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:	10
3	No. of Quizzes:	0	Max. Marks for each Quiz Test:	--

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

ROBOTICS LAB

SYLLABUS FOR B.E. VII-SEMESTER

Instruction : 2 Hours /week	SEE Marks : 50	Course Code : U20PC731ME
Credits : 1	CIE Marks: : 30	Duration of SEE : 2 Hours

List of Experiments:

- Study of different types of robots based on configuration.
- Modelling and simulation of 3 dof RRR planar manipulator in ADAMS.
- Modelling of 4 dof SCARA in ADAMS.
- Modelling of 6 dof anthroporphic arm in ADAMS.
- Determination of work volume of 6-axis robot.
- Estimation of accuracy, repeatability and resolution of 6-axis robot
- Pick and Place Robot: pick an object from a given location and to place it in another location.
- Compliance Robot: Programme the robot to insert peg in hole
- Point to point control of robot
- Continuous path control of robot
- Forward kinematic analysis of 3 dof RRR Planar Robot using Matlab (Simscape Multi-body)
- Forward kinematic analysis of 4 dof SCARA Robot using Matlab (Simscape Multi-body)
- Inverse kinematic analysis of 3 dof RRR Planar Robot using Matlab (Simscape Multi-body)
- Inverse kinematic analysis of 4 dof SCARA Robot using Matlab (Simscape Multi-body)

Note: Any 12 Experiments can be conducted

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: 3 Hours			