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 III & IV SEMESTERS OF MECHANICAL ENGINEERING
(R-21)
WITH EFFECT FROM 2022-23
(For the students admitted in 2021-22)

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-21)
B.E. – MECH : THIRD SEMESTER (2022-2023)

Course Code	Name of the Course	B.E (MECH) III Semester						
		Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
U21BS310MA	Transform Techniques & Partial Differential Equations	3	-	-	3	60	40	3
U21ES310CE	Mechanics of Materials	3	-	-	3	60	40	3
U21ES310CS	Programming for Engineers	3	-	-	3	60	40	3
U21PC310ME	Applied Thermodynamics	3	-	-	3	60	40	3
U21OE3XXXX	Open Elective-I	2	-	-	3	60	40	2
U21HS010EH	Human Values and Professional Ethics-II	1	-	-	2	40	30	1
U21HS320EH	Skill Development-I (Communication Skills-I)	1	-	-	2	40	30	1
U21BS340MA	Skill Development-II (Aptitude-I)	1	-	-	2	40	30	1
PRACTICALS								
U21ES311CE	Mechanics of Materials Lab	-	-	2	3	50	30	1
U21ES311CS	Programming for Engineers Lab	-	-	2	3	50	30	1
U21PC311ME	Applied Thermodynamics Lab	-	-	2	3	50	30	1
TOTAL		17	-	6		570	380	20
GRAND TOTAL		23				950		20

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF MATHEMATICS

TRANSFORM TECHNIQUES & PARTIAL DIFFERENTIAL EQUATIONS
SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week): 3+1	SEE Marks:60	Course Code: U21BS310MA
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	**At the end of the course students will be able to:**
1. Understand the Definition of Laplace Transform and its Properties 2. Understand the Definition of inverse Laplace Transforms-Properties and it's applications. 3 Study the Fourier series, conditions for expansion of function and half range series 4 Formulate and understand linear and nonlinear partial differential equations. 5 Study the applications of Partial Differential equations	1. Evaluate Laplace transforms of functions. Apply Laplace transforms to evaluate integrals 2. Evaluate Inverse Laplace transforms of functions. Apply transforms to solve ordinary differential equations arising in engineering problems. 3 Expand any function which is continuous, Discontinuous, even or odd in terms of its Fourier series. 4 Formulate the Partial differential equations by eliminating arbitrary constants and functions and solve linear, non linear Partial differential equations. 5 Solve the one dimensional wave(Vibrations of a string), heat equations and two dimensional heat equations.

UNIT-I (10 Hours)
Laplace Transforms: Introduction to Laplace transforms - Sufficient Condition for Existence of Laplace Transform –Properties of Laplace Transform-First shifting- Second shifting-Change of scale- Multiplication with t^n - Division by t – Laplace Transform of Derivatives - Laplace Transform of Integrals Evaluation of Integrals by Laplace Transforms.

UNIT-II (10 Hours)
Inverse Laplace Transforms: Introduction to Inverse Laplace transforms - –Properties of Inverse Laplace Transform-First shifting- Second shifting-Change of scale- Multiplication with s^n - Division by s – Method of partial fractions - Convolution Theorem (without proof)-

Application of Laplace transforms to higher order linear differential equation with Constant Coefficient

UNIT –III (10 Hours)
Fourier series: Introduction to Fourier series – Conditions for a Fourier expansion – Functions having points of discontinuity – Change of Interval - Fourier series expansions of even and odd functions - Fourier Expansion of Half- range Sine and Cosine series.

UNIT –IV (10 Hours)
Partial Differential Equations: Formation of first and second order Partial Differential Equations - Solution of First Order Equations – Linear Equation - Lagrange's Equation - Non-linear first order equations – Standard Forms.

UNIT-III (8 Hours)
Applications of Partial Differential Equations: Method of Separation of Variables - One Dimensional Wave Equation- One Dimensional Heat Equation – Two Dimensional Heat equation (steady state condition).

Text Books:
1 R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
2 Higher Engineering Mathematics, Dr.B.S Grewal   40th Edition, Khanna Publishers.

Reference Books:
1 Advanced Engineering Mathematics, Kreyszig E, 8 th Edition, John Wiley & Sons Ltd, 2006.
2 A text book of Engineering Mathematics by N.P.Bali & Manish Goyal, Laxmi Publication.

Online Resources:
1 **http://mathworld.wolfram.com/topics**
2 **http://www.nptel.ac.in/course.php**

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

1	No. of Internal	:	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	:	90 Minutes		

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

MECHANICS OF MATERIALS
SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: U21ES310CE
Credits : 3	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. Learn the analysis of members subjected to axial and transverse loads. 2. Assess the behavior of columns subjected to axial loads and compute stresses in beams due to bending. 3. Analyse the stresses developed in shafts, springs due to torsion and internal pressure in cylinders.	1. Analyse members subjected to axial loads including thermal effects using basic concepts of Mechanics of materials. 2. Draw shear force and bending moment diagrams in statically determinate beams. 3. Compute stresses and strains in bending, shear and principal stresses. 4. Determine the deflection of statically determinate beams subjected to UDL and point loads using double integration method and apply Euler's theory for long columns. 5. Compute stresses in circular shafts for torsion, springs subjected to axial load and stresses induced in cylinders.

UNIT-I: **Stresses and Strains:** Definitions, types of stresses and strains. Elasticity and plasticity. Hooke's law. stress-strain diagrams for engineering materials. Modulus of elasticity. Poisson's ratio. Relationship between elastic constants. Linear and volumetric strains. Bars of uniform strength. Temperature stresses. Compound bars.

UNIT-II: Shear Force and Bending Moment: Bending moment and shear force diagrams for cantilever, simply supported beams and beams with overhangs carrying point and uniformly distributed loads. Relationship between intensity of loading, shear force and bending moment.

UNIT-III: Stresses in Beams: Simple theory of bending. Moment of resistance. Modulus of section.   Distribution of shear stresses in

rectangular, I- and T-, standard steel and hollow sections. Compound stresses, principal stresses and strains. Mohr's circle of stress.

UNIT-IV: Deflections: Slope and deflections by the method of double integration in cantilever, simply supported beams and beams with over hangs subjected to point loads and uniformly distributed loads.
Columns: Euler's theory of long columns with axial load.
UNIT-V: Torsion: Derivation of torsion formula for circular sections. Torsional stresses, angle of twist, power transmission, effect of combined bending and torsion. Close coiled helical springs with axial load.
Cylinders: Stresses in thin and thick cylinders with internal and external pressures. Hoop and longitudinal stresses. Stresses in compound cylinders.

Learning Resources:
1. Ferdinand P. Beer, E. Russell Johnston, John T. Dewolf, Mechanics of Materials, 2017.
2. Ramamrutham S., Narayanan R., Strength of Materials, Dhanpat Rai Publishing Company, 2011.
3. Bansal R.K., A text book of Strength of Materials, Laxmi Publications, 2010.
4. Rajput R.K., Strength of Materials, S.Chand Publications, 2006.
5. Junnarkar S.B., Mechanics of Structures (Vol-I & II), Charotar Publishing House, Anand, 2002.
6. Pytel and Singer F.L., Strength of Materials, Harper & Row, New York, 1999.
7. Subramanian R., Strength of Materials, Oxford University Press, 2010.
8. Hibbeler.R., Mechanics of Materials, Pearson Publishers, 2017
9. Bhavikatti.S.S, Strength of Materials, Vikas Publishers, 2013

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 COMPUTER SCIENCE & ENGINEERING

PROGRAMMING FOR ENGINEERS
SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code :**U21ES310CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES In this subject the students will	**COURSE OUTCOMES** On completion of the course, students will be able to
1 acquire problem solving skills. 2 develop flow charts. 3 understand structured programming concepts. 4 write programs in C Language.	1 design flowcharts and algorithms for solving a given problem using the fundamentals of programming. 2 apply decision making, looping constructs and functions to develop programs for a given problem. 3 store data using arrays and perform searching and sorting operations on the data. 4 design programs on string handling and operations on arrays using dynamic memory management techniques. 5 develop programs to store data and perform operations using structures and files.

UNIT-I:
Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Flowcharts. Number Systems (Binary, Octal, Decimal and Hexadecimal)
Introduction to C Language: Background, C Programs, Identifiers, Data types, Variables, Constants, Input/Output, Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Operators.

UNIT-II:
Selection: simple if, if-else, else if ladder, nested if and switch – case.
Repetition: Introduction to loops, while, for, do-while statements, break, continue, goto.
Functions: Designing Structured Programs, Functions Basics, User Defined Functions, Inter-Function Communication, Standard Functions, Scope, Storage Classes-Auto, Register, Static, Extern, Scope Rules. Recursive Functions

UNIT-III:
Arrays: Concepts, One-Dimensional Arrays in C, Array Applications: Linear Search and Binary Search, Selection Sort and Bubble Sort. Two-Dimensional Arrays, Applications: matrix operations

UNIT-IV:
Pointers: Introduction, Pointers for Inter-Function Communication, Pointer Arithmetic. Introduction to dynamic memory allocation
Character handling functions: input, output character handling functions, built in character handling functions
Strings: Introduction to strings, Input and Output operations using scanf(), printf(), gets(), puts(). String library functions: strlen(), strcpy(), strcat(), strcmp(), strlwr(), strupr(), strrev(); basic programs using string library functions, Array of strings.

UNIT-V:
Structure: Definition and Initialization of Structures, Accessing Structures, Arrays of Structures, Structures and Functions, Unions.
Files: Introduction to files, file operations, reading data from files, writing data to files. Basic programs using files.
Pre-processor Directives: Types of pre-processor directives, examples.

Learning Resources:
1. Forouzan B.A & Richard F. Gilberg, A Structured Programming Approach using C,3rd Edition(2013), Cengage Learning.
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition (2006), Prentice-Hall.
3. Rajaraman V, The Fundamentals of Computer, 4th Edition(2006), Prentice-Hall of India
4. Steve Oualline, Practical CProgramming,3rd Edition(2006),O'Reilly Press.
5. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5thEdition (2007), Pearson Education.
6. Balagurusamy E, Programming in ANSI C, 4th Edition(2008), TMG.
7. Gottfried, Programming with C, 3rd Edition(2010), TMH.
8. R G Dromey, How to Solve it byComputer,1st Edition(2006), Pearson Education.

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 Mechanical Engineering

APPLIED THERMODYNAMICS
SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U21PC310ME
Credits :03	CIE Marks:40	Duration of SEE:03Hours

Course Objectives	Course Outcomes
The prime objective of the course is to get acquaintance with the applications in air compressors, internal combustion engines and components of steam power plants.	On completion of the course, the student will be able to 1. analyze the performance of reciprocating air compressors. 2. describe the working of IC engines and evaluate the performance parameters. 3. explain the various stages of combustion phenomena in IC engines. 4. analyze the performance of vapour power cycles and steam boilers. 5. explain the working principles of nozzles and condensers.

Unit-I: Reciprocating Air Compressors
Applications of compressed air; classification of compressors–single and multi-stage compressors, work done with and without clearance volume, work done in single- and multi-stage compressors; effect of clearance volume on work done; inter-cooling and after-cooling.

Unit-II: Internal Combustion Engines
Classification of IC engines, working principles of 2-stroke, 4-stroke, SI and CI engines; valve- and port-timing diagrams; deviation of actual cycles from air standard cycles; Performance of IC engines: indicated power, brake power, frictional power, mechanical efficiency, brake thermal efficiency, indicated thermal efficiency, relative efficiency, volumetric efficiency, specific fuel consumption (SFC), Morse test, heat balance sheet.

Unit-III: Combustion in IC Engines
Normal and abnormal combustion phenomena in SI engines and CI engines; effect of engine variables on stages of combustion and knocking; Fuel requirements and fuel rating; anti-knock additives: types of combustion chambers in SI and CI engines; air pollution from IC engines and its ill effects.

Unit-IV: Steam Power Plant and Steam Boilers

Working of Carnot and Rankine cycles; cycle efficiency improvement methods: concepts of reheating and regeneration;

Classification of boilers-fire tube boilers- Cochran boiler; water tube boilers-Babcock and Wilcox boiler; super critical boilers-Benson boiler; boiler mountings and accessories; boiler performance; boiler draught.

Unit-V: Steam Nozzles and Condensers

Steam nozzles: Types of nozzles; nozzle efficiency; steam velocity; mass of steam discharged; condition for maximum discharge; critical pressure ratio; throat and exit diameters for maximum discharge;

Types of condensers: jet and surface condensers; atmospheric cooling tower.

Learning Resources:

1. Eastop, T.D, Mc Conkey, A, "Applied Thermodynamics for Engineering Technologists", 5th Edition, Pearson Education, New Delhi, 2017.
2. Ganesan.. V, "Internal Combustion Engines", 4th edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2010.
3. Rajput R.K, "Thermal Engineering", 10th edition, Laxmi Publishers, New Delhi, 2016.
4. Mathur & R.P. Sharma, Internal Combustion Engines, Dhanapat Rai & Sons, 2013.
5. Ballaney. P.L, "Thermal Engineering", 25th edition, Khanna Publishers, New Delhi, 2010.

Data book: S.C. Jain, "Steam tables", 15th edition, Birla publications Pvt. Ltd., New Delhi 2006.

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

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

B.E- III SEM OPEN ELECTIVE-I COURSES			
Dept.	**Title**	**Code**	**Credits**
MECH	Geometric Modelling	U21OE310ME	2
	Introduction to Unmanned Aerial Vehicles	U21OE320ME	2
	Basic Heat Transfer for Electronic Systems	U21OE330ME	2
CIVIL	Green Buildings	U21OE310CE	2
IT	Principles of Python Programming	U21OE310IT	2
	Introduction to Linux	U21OE320IT	2
Maths	Linear Algebra	U21OE310CE	2
Physics	Smart Materials and Applications	U21OE310PH	2
Chemistry	Battery Science and Technology	U21OE310CH	2
	Corrosion and its Prevention	U21OE320CH	2
HSS	Learning to Learn	U21OE310EH	2

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of Mechanical Engineering

GEOMETRIC MODELLING (Open Elective-I)
SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U21OE310ME
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
	On completion of the course, students will be able to
The objective of this course is to understand wire-frame modelling & transformations, surface, solid modelling and assembly modelling techniques.	1 identify various Wire frame modelling entities and their representations.
	2 interpret synthetic curve representations and various 2D transformations for geometric model by matrix approach.
	3 development of various surfaces using surface modelling.
	4 analyze various solid models using various solid modelling schemes and Study various Assembly constraints, Assembly tree and develop few assembled models.

UNIT-I: INTRODUCTION TO CAD
product life cycle, conventional design and computer aided design.
Wire Frame Modelling: wire frame entities and their definitions. Interpolation and approximation of curves. Concept of parametric and non–parametric representation of circle and helix curves, demonstration of 2D geometry through CAD software.

UNIT-II: SYNTHETIC CURVES
Parametric representation of cubic spline, Bezier and B– spline curves, continuity, properties and characteristics of splines. Concepts of NURBS, synthetic curves demonstration.
2D transformation and their mathematics: Translation, scaling, rotation, Homogeneous co-ordinates, Concatenated transformations.

UNIT-III: SURFACE MODELING

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

UNIT-IV: SOLID MODELLING

C– rep and B– rep and feature instancing, Octree encoding, spatial enumeration, cell decomposition, sweeping approaches. Euler's representation of solid models, creation of solid model in CAD software.

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

Learning Resources:

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

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

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	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

INTRODUCTION TO UNMANNED AERIAL VEHICLES
(Open Elective-I)
SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U21OE320M**E**
Credits :02	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
	On completion of the course, students will be able to
The objective of this Course is to understand the features of UAV, elements, navigation and guidance of UAV and to design and silmulate UAV	1. Explain the types and characteristics of UAVs and their applications. 2. Illustrate the concepts of aerodynamics of flight vehicle. 3. Identify and explain the components, sensors and payload of UAVs, their navigation and guidance. 4. Design and perform structural, aerodynamic analysis of UAV components

Unit-I: Introduction to UAV
UAV: Definition, History; Difference between aircraft and UAV; DGCA Classification of UAVs; Types and Characteristics of Drones: Fixed, Multi-rotor, and Flapping Wing; Applications: Defense, Civil, Environmental monitoring.

Unit-II: Basics of Flight
Different types of flight vehicles; Components and functions of an airplane; Forces acting on Airplane; Physical properties and structure of the atmosphere; Aerodynamics – aerofoil nomenclature, aerofoil characteristics, Angle of attack, Mach number, Lift and Drag, Propulsion and airplane structures.

Unit-III: UAV Elements, Navigation and Guidance
Components: Arms, motors, propellers, electronic speed controller (ESC), flight controller; Propulsion; Data Link; Sensors and Payloads: GPS, IMU, Light Detection and Ranging (LiDAR), Imaging cameras, Classification of payload based on applications; Hyper-spectral sensors; Laser Detection and

Range (LADAR); Synthetic Aperture Radar (SAR); Thermal cameras; ultrasonic detectors; Case study on payloads. Introduction to navigation systems and types of guidance; Mission Planning and Control.

Unit-IV: Design & Simulation of UAV
Introduction to CAD; Design of UAV components; Structural Analysis using CAE; Aerodynamic Analysis using CFD; Manufacturing of the components of UAVs: 3D printing; Case studies;

Learning Resources:
1.   Andey Lennon, "Basics of R/C Model Aircraft Design" Model Airplane News Publication
2.   John Baichtal, Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs.
3.   K Valavanis, George J Vachtsevanos, Handbook of Unmanned Aerial Vehicles, New York,
      Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.
2.   DGCA RPAS Guidance Manual, Revision 3 – 2020

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

BASIC HEAT TRANSFER FOR ELECTRONIC SYSTEMS
(Open Elective-I)
SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U21OE330ME
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
	On completion of the course, students will be able to
The objective of this course is to study the basic laws of thermodynamics and the cooling of electronic equipment along with basic modes of heat transfer	1 understand and apply the first and Second laws of thermodynamics to various engineering problems.
	2 formulate heat conduction problems in rectangular, cylindrical and spherical coordinate system by transforming the physical system into a mathematical model.
	3 to determine heat transfer coefficient in forced and free convection heat transfer.
	4 analyse heat transfer processes involved in cooling of electronic components

UNIT-I: BASIC THERMODYNAMICS
Basic Concepts-System, Types of Systems, Control Volume, Surrounding, Boundaries, Universe, Macroscopic and Microscopic viewpoints, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi–static process; Zeroth Law of Thermodynamics, First and Second laws of Thermodynamics. Numerical problems.

UNIT-II: heat transfer: Conduction
Heat Transfer – Different Modes, governing laws and application to heat transfer: Fourier, Newton, Stefan–Boltzmann laws; general heat conduction equation – Steady state one-dimensional heat conduction through slabs, hollow cylinders and spheres. Concept of thermal resistance in series and parallel (composite systems), contact resistance, overall heat transfer coefficient. Critical radius of insulation. Heat transfer with and without internal heat generation. Numerical problems.

UNIT-III: Heat transfer: Convection
Extended surfaces: Fins – Applications of fins, Fin Equation, Fin Effectiveness and Efficiency. Convection Heat Transfer: Heat transfer coefficient – Forced and Natural Convection in Electronic Devices, non

dimensional numbers – Nusselt number, Reynolds number, Grashoff number and Prandlt number, forced and free convection correlations – flat plates and cylinders. Numerical problems.

UNIT-IV: COOLING OF ELECTRONIC EQUIPMENT
Needs & Goals; Temperature effects on different failure modes; Electronic equipment for airplanes, missiles, satellites and spacecraft; electronic equipment for ships & submarines; electronic equipment for communication systems and ground support system; chassis and circuit boards cooling.

Learning Resources:
1. P.K. Nag, "Engineering Thermodynamics", Tata Mc Graw Hill, 4th Edition, 2008.
2. Yunus Cengel & Boles, "Thermodynamics – An Engineering Approach", TMH New Delhi, 2008.
3. Sachadeva R.C., "Fundamentals of Engineering Heat and Mass Transfer", New Age International (P) Ltd Publishers, New Delhi, 2010.
4. Dave S. Steinberg, "Cooling Techniques for Electronic Equipment", Second Edition, John Wiley & Sons, 1991.
5. Yunus Cengel & Afshin J Ghajar, "Heat and Mass Transfer: Fundamentals & its Applications",   Mc Graw Hill, 5th Edition, 2013.

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

GREEN BUILDINGS (Open Elective-I)
SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:60	Course Code: U21OE310CE
Credits: 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	Upon the completion of this course the students will be expected to:
1. Learn the principles of planning and orientation of buildings. 2. Environmental implications of natural and building materials along with green cover 3. Acquire knowledge on various aspects of green buildings	1. Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting 2. Relate the need of Green Technology 3. Understand the concepts of green building technologies 4. Understand rating systems of GRIHA IGBC and LEED

UNIT-I: Planning of buildings: Principles of planning, Relevant building bylaws, site selection for buildings, orientation of buildings, Provision of rain water harvesting

UNIT-II: Building-Energy-Implications: Environmental implications of buildings energy, carbon emissions, water use, waste disposal; Building materials: sources, methods of production and environmental Implications. Green building materials and recycling, Green cover and built environment

UNIT-III: Green Building Technologies: Introduction- Necessity – Concept of Green building. Principles of green building – Site selection criteria for Green Buildings – effective cooling and heating systems – effective electrical systems-Passive solar architecture – effective water conservation systems

UNIT-IV: Certification Systems: Certification systems- Green Rating for Integrated Habitat Assessment (GRIHA), Indian Green Building Council (IGBC) and Leadership in Energy and Environmental Design (LEED), case studies

Learning Resources:

1. Kumara Swamy N.Kameswara Rao A., Building Planning And Drawing, Charotar, Publications, 2013.
2. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 2004.
3. Michael Bauer, Peter Mösle and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2010.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison "Green Building Handbook" Volume I, Spon Press, 2001.
5. Mili Majumdar, "Energy-efficient buildings in India" Tata Energy Research Institute, 2002.
6. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute, 2009.

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	: 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 ELECTRICAL AND ELECTRONICS ENGINEERING

Non Conventional Energy Sources
Open Elective-I
SYLLABUS FOR B.E. III SEMESTER

L: T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code:**U21OE310EE**
Credits:2	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 provide a survey of the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state- of -the-art energy systems.	1. Demonstrate the generation of electricity from various Non-Conventional sources of energy and solar power generation 2. Illustrate the generation of energy from wind and generation of energy from waste 3. Demonstrate the generation of energy by biomass and fuel cells 4. Illustrate the ocean and geo thermal energy generation

UNIT-I: Introduction and Solar Energy:
Introduction: Need for Non-conventional energy sources, Types of Non-Conventional energy sources. Renewable energy across the Global and in India. Renewable energy for rural applications, Renewable energy for urban, industrial and commercial applications
Solar Energy: Solar cell fundamentals: Semiconductors, Photovoltaic effect, Solar PV cell, module, panel, array, Solar cell operating characteristics: Voltage-current characteristic, energy losses, maximising the performance. Applications of solar energy, Solar energy program in India, Case study

UNIT-II: Wind Energy and Waste to Energy:
Wind Energy: Nature of wind, Basic components of Wind Energy Conversion System(WECS), Power extraction from the wind, Applications of wind energy. Wind energy program in India, Case Study
Waste to Energy: Key issues, Waste recovery management, Case study

UNIT-III: Biomass Energy and Fuel Cells:

BiomassEnergy: Definition, Bio fuels, Biomass resources, Biomass conversion technologies: Incineration- Thermo chemical conversion- Bio-chemical conversion. Advantages and disadvantages of biomass energy, Case study

Fuel Cells: Definition-Classification of fuel cells, Principle of operation, Hydrogen-oxygen fuel cell, Alkaline fuel cell, Proton exchange membrane fuel cell, Molten carbonate fuel cell, Solid oxide electrolyte cells, Comparison of fuel cells- Advantages and Disadvantages of fuel cells-Applications of Fuel cells. Case study

UNIT-IV: Ocean Energy and Geothermal Energy:

Ocean Energy: Ocean thermal electric conversion (OTEC) methods: Open cycle and Closed cycle- Principles of tidal power generation-Advantages and limitations of tidal power generation, Case study

Geothermal Energy: Geothermal resources- Vapour dominated geothermal plant- Liquid dominated geothermal plant- Applications of Geothermal Energy, Case study

Learning Resources:

1. B H KHAN, Non-Conventional Energy Resources, McGraw Hill, 2nd Edition, 2009.
2. G. S. Sawhney, Non-Conventional Energy Resources, PHI Learning Pvt Ltd, 2012
3. ShobhNath Singh, Non-Conventional Energy Resources, Pearson, 2016
4. G.D. Rai, Non-Conventional Energy Sources ,Khanna Publishers, New Delhi, 2011.
5. Ashok Desai V, Non-Conventional Energy, Wiley Eastern Ltd, 1990.
6. Mittal K.M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, 1997.
7. Ramesh R, Kurnar K.U, Renewable Energy Technologies, Narosa Publishing House, New Delhi, 1997.

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

FUNDAMENTALS OF DATA STRUCTURES
(Open Elective-I)
SYLLABUS FOR III-SEMESTER

L:T:P(Hrs./week): 2:0:0	SEE Marks : 60	Course Code :**U21OE310IT**
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
	On completion of the course, students will be able to
Explore efficient storage mechanisms for easy access, design and implementation of various data structures.	1. Identify appropriate linear data structure to solve a problem.
	2. Illustrate the usage of linked lists for various applications
	3. Demonstrate the usage of non-linear data structures – graphs & trees

UNIT – I: **Introduction to Data Structures:** Performance Analysis: Time and Space complexity.
Introduction to Data Structures: Stacks, Representation of a Stacks using Arrays, Applications.
Queues: Representation of a Queue using array, Applications.

UNIT – II: **Linked List:** Introduction, Singly Linked list, Operations on a Singly linked list, Dynamically Linked Stacks and Queues.

UNIT – III: **Doubly linked list**: Introduction, Doubly linked list, Operations on a doubly linked list.

UNIT – IV: **Introduction to Non-Linear Data Structures:** Trees and Graphs

Learning Resources :
1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2/e, Universities Press, 2008
2. Mark Allen Weiss, ―Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 1996

3. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla , — Data Structures and Program Design in C, Second Edition, Pearson Education, 2007
4. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application', TMH, 2nd Edition.
5. Richard F, Gilberg, B.A. Forouzan, "Data Structures, A Pseudocode Approach with C", Cengage, 2nd Edition
6. http://nptel.ac.in/courses/106106127/

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 INFORMATION TECHNOLOGY

INTRODUCTION TO LINUX
(Open Elective – I)
SYLLABUS FOR –III SEMESTER

L:T:P(Hrs./week): 2:0:0	SEE Marks :60	Course Code : **U21OE320IT**
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	On completion of the course, students will be able to
Acquire basic skills for using Linux operating system.	1. Install Linux operating system and use desktop environment. 2. Identify and use Linux utilities to create and manage simple file processing operations. 3. Organize directory structures with appropriate security. 4. Configure and use Linux shell.

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

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

UNIT – III:
Introduction to Shell Scripting: Reading input from the user, logical operators, Arithmetic operators, Environment variables, Read-only variables, command line arguments, working with arrays.

UNIT – IV:
Decision Making: Conditional constructs, Functions: Introduction to functions, passing arguments, sharing of data, declaration of local variables, returning information from functions, running functions in the background, creating a library of functions

Learning resources:
1. Introduction to Linux – A Hands On Guide, MachteltGarrels.
2. Ganesh SanjivNaik, Learning Linux Shell Scripting, Packt Publishing, 2015. Open Source Community
3. https://linuxjourney.com/
4. https://nptel.ac.in/courses/117106113/

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 MATHEMATICS

LINEAR ALGEBRA (Open Elective-I)
SYLLABUS FOR B.E. III-SEMESTER

L : T: P (Hrs./week):2:0:0	SEE Marks:60	Course Code: U21OE310MA
Credits: 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	*At the end of the course students will be able to:*
1. Study the concept of Vector Spaces and understand the meaning of Basis and Dimension of a vector Space and Co-ordinates.	1. Solve the problems on Vector Spaces and determine the Basis and Dimension of a Vector Space and find the Co-ordinates.
2. Understand the meaning of Linear transformation, properties.	2. Determine Linear Transformation, Range and Kernel and Matrix of Linear Transformation.
3. Understand Range and Kernel, Rank-Nullity and Matrix of Linear Transformation.	3. Determine Range and Kernel, Rank-Nullity and Matrix of Linear Transformation.
4. Understand Inner Product Spaces, Orthonormal sets, Gram-Schmidt's Orothogonalization process.	4. Determine distance, orthogonal, orthonormal sets and construct orthonormal basis based on Gram-Schmidt's Orothogonalization process.

UNIT – I (8 classes)**Vector Spaces**-Definition of a Vector Space, Subspaces, Basis and Dimension, Coordinates and Change of Basis.

UNIT – II (6 classes)**Linear Transformation -I**
Definition of Linear Transformation- Properties of Linear Transformations – Product of Linear Transformations – Algebra of Linear Operators- Linear sum- Scalar multiple-Composition of maps.

UNIT – III (6 classes)**Linear Transformation -II** Range and kernel of a linear map – Dimension of Range and Kernel - Rank and nullity – Inverse of linear transformation - Rank nullity theorem (without Proof)- Matrix of Linear Transformation.

UNIT – IV (8 classes)**Inner Product Spaces**-The Dot Product on R and Inner Product Spaces, Orthonormal Bases, Orthogonal Complements-Gram-Schmidt's Orthonormolization process.**Learning Resources**:

1. Introduction to Linear Algebra with Application, Author : Jim Defranza, Daniel Gagliardi, Publisher : Tata McGraw-Hill

2. An Introduction to Linear Algebra, V.Krishna Murthy, V.P Mainra, J.L Arora, Affiliated to East-West Press Pvt Ltd

Reference Books:

1   Elementary Linear Algebra, Author: Anton and Rorres, Publisher: Wiley India Edition.
2   Advanced Engineering Mathematics, Author : Erwin Kreysig, Publisher : Wiley Publication
3   Elementary Linear Algebra, Author : Ron Larson, Publisher : Cengage Learning

Online Resources :
1   **http://mathworld.wolfram.com/topics**
2   **http://www.nptel.ac.in/course.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   : 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 PHYSICS

SMART MATERIALS AND APPLICATIONS
(Open Elective-I)
SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U21OE310PH
Credits :02	CIE Marks:40	Duration of SEE:03Hours

Course Objectives	Course Outcomes	BTL
The student will be able to	**the student should at least be able:**	
1. grasp the concepts of 27entu and ferro electric materials	1. summarize various properties and applications of 27entu and ferro electric materials	2
2. Learn fundamentals of pyro and 27enture electric materials	2. apply fundamental principles of pyro and 27enture electricity in relevant fields of engineering	3
3. gain knowledge on shape memory alloys	3. Explain types of shape memory alloys and their properties and applications	3
4. acquire fundamental knowledge on chromic materials	4. Outline the importance of chromic materials in engineering fields.	2

UNIT I: PIEZO AND FERRO MATERIALS (8 hours)
Piezo electric effect and inverse piezoelectric effect, Piezo electric materials, Structure of Quartz crystal, Piezoelectric oscillator, Magnetostriction, Magnetostriction oscillator, piezo-electric sensors, applications of Piezo-electric materials.
Characteristics and properties of ferro-electric materials, Curie-Weiss law, applications of Ferro electric materials

UNIT II: PYRO AND THERMO-ELECTRIC MATERIALS (6 hours)
Pyroelectricity: pyro electric effect, pyro electric materials, pyro-electric detector.
Thermoelectricity: thermoelectric effect, Seebeck effect, Peltier effect, thermocouple, Principle and working of thermoelectric generator and Thermoelectric cooler, applications of thermoelectric materials

UNIT III: SHAPE MEMORY MATERIALS (8 hours)
Introduction to shape memory alloys (SMA)- Shape Memory Effect (SME), Austenite, Martensite phases, Properties and characteristics SMAs**,** Super

elasticity, one-way and two way shape memory effects, Properties of Ni-Ti shape memory alloy, Cu-based shape memory alloys, and their applications, Applications of SMAs.

UNIT-IV: (6 hours)
Electro-chromaticity, Electro-chromic materials, Electro-chromic sensors and devices.
Photo-chromaticity, Photo-chromic materials, Photo-chromic sensors and devices.
Thermo-chromaticity, 28enture-chromic materials, 28enture-chromic sensors and devices.
Smart fluids: Magneto-rheological and Electro-rheological fluids.

Learning Resources:
1. K. Otsuka and C M Wayman, Shape memory materials, Cambridge university press, 1998.
2. T W Duerig, K N Melton, D Stockel, C M Wayman, Engineering aspects of shape memory alloys, Butterworth-Heinemann, 1990
3. A.K. Sawhney, A Course in Electronic Measurements and Instrumentation, Dhanpat Rai & Sons, 2015
4. D. Patranabis, Sensors and Transducers, PHI Learning Pvt. Ltd., 2013

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF CHEMISTRY

BATTERY SCIENCE AND TECHNOLOGY
(Open Elective-I)
SYLLABUS FOR B E III Semester

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U21OE310CH
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES:	COURSE OUTCOMES:
The course will enable the students to:	At the end of the course students should be able to:
1. Introduce the various terms to understand the efficiency of batteries. 2. Know the relevant materials required for the construction of primary and secondary batteries. 3. Familiarize with the reactions involved during charging and discharging processes. 4. Emphasise the need of fuel cells and the concept of their construction and functioning.	1. Discuss the construction, electrochemistry, technology and applications of selected primary batteries 2. Discuss the construction, electrochemistry, technology and applications of few secondary batteries 3. Explain the working principle, electrochemistry, technology and applications of prominent fuel cells 4. Evaluate different batteries or fuel cells in order to select a suitable battery or fuel cell for a given application

| **CO-PO MAPPING FOR BATTERY SCIENCE AND TECHNOLOGY** |

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	1	-	-	-	-	1	-	-	-	-	1
2	3	1	-	-	-	-	1	-	-	-	-	1
3	3	1	-	-	-	1	1	-	-	-	-	1
4	3	1	-	-	-	1	1	-	-	-	-	1

UNIT-I: BATTERIES – FUNDAMENTALS

Introduction and types of batteries: Primary and secondary.
Battery characteristics: Free energy change, electromotive force of battery, ampere – hour, capacity, power, power density, energy density, efficiency, cycle life, tolerance to service conditions, performance characteristics.

UNIT-II: PRIMARY BATTERIES

Construction, chemistry and technology of Zinc – Air Battery, Zinc – HgO battery and their applications.

Primary lithium batteries: Soluble cathode cells, solid cathode cells – Lithium manganese dioxide, solid electrolyte cells- Lithium polymer electrolyte battery – Applications. Reserve battery – Electrochemistry of perchloric acid cell – applications.

UNIT-III: SECONDARY BATTERIES
Construction, chemistry and technology of maintenance free lead acid battery (MFLA), valve regulated lead acid battery (VRLA), absorbed glass mat lead acid battery (AGMLA) – comparision between lead acid battery and VRLA along with advantages – Construction, electro chemistry and applications of Nickel – Cadmium battery, Nickel metalhydride battery.
Lithium ion batteries: Construction, chemistry and applications of liquid organic electrolyte cells, polymer electrolyte cells, lithium ion cells.

UNIT- IV: FUEL CELLS
Introduction, classification based on temperature and nature of electrolyte. Working principle, components, applications and environmental aspects of alkaline fuel cell (AFC) – Hydrogen – Oxygen alkaline fuel cell, Molten carbonate fuel cell (MCFC), Polymer electrolyte membrane fuel cell (PEMFC), Solid oxide fuel cell (SOFC).

Books:
1. P. C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai and Pub, Co., New Delhi (2002)
2. S. S. Dara "A text book of engineering chemistry" S. Chand and Co. Ltd. New Delhi (2006).
3. Dell R. M. and Rand D. A. J., "Understanding Batteries", Royal Society of Chemistry, UK, 2001.
4. Chemistry of Engineering Materials by R. P. Mani and K. N. Mishra, CENGAGE learning
5. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 2008.

Suggested Reading:
1. Dell R. M. and Rand D. A. J., "Understanding Batteries", Royal Society of Chemistry, UK, 2001.
2. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993.

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF CHEMISTRY

CORROSION AND ITS PREVENTION
(Open Elective-I)
SYLLABUS FOR B E III Semester

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U21OE320CH
Credits :02	CIE Marks:40	Duration of SEE:03Hours

OURSE OBJECTIVES	COURSE OUTCOMES:
The course will enable the students to:	At the end of the course students should be able to:
1. Acquaint with the causes and factors influencing the rate of corrosion 2. Understand the different types of corrosion like dry, wet and galvanic corrosion and their relative impact 3. Familiarize with various preventive methods of corrosion such as cathodic protection, use of inhibitors, coatings, etc. 4. Familiarize with industrial coating methods like electroplating, electrolessplating.	1. Explain different types of corrosion and factors that affect corrosion and passivation of metals. 2. Select a suitable metallic coating, organic coating and inhibitors for corrosion control of the equipment in a given application. 3. Discuss the principles and applications of cathodic protection and surface conversion coatings for corrosion control. 4. Apply the knowledge of various methods of corrosion control to suggest a solution for corrosion control of a given equipment in a given industrial application.

CO-PO MAPPING FOR CORROSION AND ITS PREVENTION

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
1	3	1	-	-	-	-	-	-	-	-	-	1
2	3	1	1	-	-	-	-	-	-	-	-	1
3	3	2	1	-	-	-	-	-	-	-	-	2
4	3	2	1	-	-	-	-	-	-	-	-	2

UNIT-I: CHEMICAL AND ELECTROCHEMICAL CORROSION
Introduction – gravity, cause, chemical and electrochemical corrosion, Pilling – Bed worth rule, effect of nature of oxide layer on rate of chemical corrosion. Galvanic corrosion, electrochemical series and galvanic series.

Formation of anodic and cathodic areas, Differential aeration corrosion – pitting, waterline corrosion, crevice corrosion, stress corrosion andcorrosion fatigue. Passivation of metals, polarization curve of passivating metals, effect of Ph and potential for iron (pourbaix diagram) and the polarization curve of iron.

Factors influencing corrosion

a. Nature of metal: Relative position of metal in galvanic series, over voltage, relative areas of anode and cathode and nature of corrosion product.

b. Nature of environment: Temperature, Ph, humidity and dissolved oxygen.

UNIT-II: CORROSION CONTROL BY METALLIC COATINGS

Metallic coatings: Types – anodic and cathodic. Pre treatment of surface of base metal. Methods of application of metallic coatings: Hot dipping- galvanization – applications of galvanized RCC steel bars. Cladding, electro plating and electroless plating- Principle and their differences. Electroplating of Cu and Cr on Fe, electroless plating of Ni and Cu on insulators, Preparation of printed circuit board (PCB) by electrolessplating.

UNIT-III: CORROSION CONTROL BY ORGANIC COATINGS AND INHIBITORS

Organic Coatings: Paints – constituents and their functions. Vitreous enamel coatings. Varnishes. Super hydrophobic and self healing coatings. Epoxy coatings on RCC steel bars- impervious coatings.

Corrosion inhibitors: Anodic, cathodic and vapour phase inhibitors.

UNIT-IV: CORROSION CONTROL BY CATHODIC PROTECTION AND SURFACE MODIFICATION

Cathodic protection: Principle, sacrificial anodic protection (SAP), impressed current cathodic protection (ICCP). Application of cathodic protection for bridges, ship hulls and underground pipelines.

Surface conversion coatings: Carburizing, nitriding, cyaniding.

Books:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
2. S. S. Dara "A text book of engineering chemistry" S. Chand and Co. Ltd., New Delhi (2006).
3. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi (2008).
4. Wiley Engineering chemistry, Wiley India pvt Ltd, II edition.

5. Chemistry in engineering and technology by J. C. Kuriacose and Rajaram.

Suggested Reading:

1. Principles and prevention of corrosion: Denny A. Jones, Prentice Hall, 1996.
2. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993
3. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering
4. Corrosion Engineering: Mars G Fontana, Mc Graw Hill, 1987

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

LEARNING TO LEARN
(Open Elective-I)
SYLLABUS FOR B E III Semester

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U21OE310EH
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Develop effective study skills, and enable students to cut down on the number of hours spent studying. 2. Explore illusions of competence in learning, the challenges of overlearning, and the advantages of interleaving. 3. Handle procrastination and learn for long term. 4. Plan, prioritise and carry out tasks based on goals and priority.	At the end of the course the learners will be able to: 1. Get learners maximize their learning in a stipulated amount of time. 2. Become competent learners and learn creatively. 3. Meet deadlines, submit progress reports and recall what has been learnt for effective usage. 4. Set Performance Standards and take initiative based on set goals.

OVERVIEW:
No matter what your skill levels in topics you would like to master, you can change your thinking and change your life. If you are struggling to cope, you'll see a structured treasure trove of practical techniques that walk you through what you need to do to get on track. If you've ever wanted to become better at anything, this course will help serve as your guide.

UNIT 1: STUDY SKILLS
Good study skills can increase a student's confidence, competence, and self-esteem. They can also reduce anxiety about tests and deadlines. This module is designed to develop effective study skills, and enable students to cut down on the number of hours spent studying, leaving more time for other important things in their life

1.1 Study Skills Checklist
1.2 Learning Styles
1.3 Habits of Effective Students
1.4 Using the Focused and Diffuse Modes

1.5 Introduction to memory and Memory Technique

UNIT 2:   Chunking
In this module, we're going to be talking about chunks. Chunks are compact packages of information that your mind can easily access. We'll talk about how you can form chunks, how you can use them to improve your understanding and creativity with the material, and how chunks can help you to do better on tests. We'll also explore illusions of competence in learning, the challenges of overlearning, and the advantages of interleaving.

2.1 Knowledge Chunking
2.2 Skill and Will
2.3 Sleep and Learning

UNIT 3:   Procrastination and Memory
In this module, we talk about two intimately connected ideas—procrastination and memory. Building solid chunks in long term memory–chunks that are easily accessible by your short term memory—takes time. This is why learning to handle procrastination is so important. Finally, we talk about some of the best ways to access your brain's most powerful long term memory systems so that learning is long term and the learner has the ability to recall and use it as per need.

3.1 Controlling Procrastination
3.2 Ranking the importance of tasks with a to- do list
3.3 Finding their most productive time
3.4 Keeping track of time spent on different tasks
3.5 Introduction to Deep learning

UNIT 4: Renaissance Learning and Unlocking Your Potential
In this module we're going to talk more about important ideas and techniques that will enhance student's ability to learn. Students will also discover how to more profitably interact with fellow learners, how to recognize your own strengths, and how to avoid the "imposter syndrome." Fighter pilots and surgeons use checklists to help them with their critical duties—you can use a similar checklist to help you prepare for tests. Ultimately, you will learn more about the joys of living a life filled with learning!

4.1 Psychology of Goal Setting
4.2 Criteria for Goal Setting
4.3 Steps in Goal Setting

4.4 Visioning
4.5 Strategy & Action Plan
4.6 Goal Progress Review

LEARNING RESOURCES

learn.talentsprint.com

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

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

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

HUMAN VALUES AND PROFESSIONAL ETHICS-II
SYLLABUS FOR B E III Semester

L:T:P(Hrs/week):1:0:0	SEE Marks:40	Course Code: U21HS010EH
Credits :01	CIE Marks:30	Duration of SEE: 02Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to:	At the end of the course the learners will be able to:
5. Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations	5. Distinguish between Personal and Professional life goals–constantly evolving into better human beings and professionals.
6. Understand professionalism in harmony with self and society.	6. Work out the strategy to actualize a harmonious environment wherever they work.
7. Develop ethical human conduct and professional competence.	7. Distinguish between ethical and unethical practices, and start implementing ethical practices
8. Enrich their interactions with the world around, both professional and personal.	8. Apply ethics and values in their personal and professional interactions.

UNIT 1: NORMATIVE ETHICS & SOCIETAL ETHICS
This unit deals with normative ethics, the branch of moral philosophy, or ethics, concerned with criteria of what is morally right and wrong. It includes the formulation of moral rules that have direct implications for what human actions, institutions, and ways of life should be like. This unit also covers societal ethics which is the systematic reflection on the moral dimensions of social structures, systems, issues, and communities.

1.1 Ethical Accountability
1.2 Society & Ethics
1.3 Rights & Responsibilities

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.

2.1 Professional Ethics
2.2 Ethical Code
2.3 Flipped Classroom

UNIT 3: PRIVACY

This unit covers "Cyber ethics" – the code of responsible 38enture38 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."

3.1 Basics of Cyber Ethics
3.2 Privacy
3.3 Flipped Classroom

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)

4.1 Media Ethics
4.2 Medical Ethics
4.3 Flipped Classroom

MODE of DELIVERY

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

Relevant Websites, CD's and Documentaries

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

Learning Resources:

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

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

1	No. of Internal Tests:	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: 90 Minutes

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

SKILL DEVELOPMENT COURSE-I (COMMUNICATION SKILLS-I)
SYLLABUS FOR B E III Semester

L:T:P(Hrs/week):2:0:0	SEE Marks:40	Course Code: U21HS320EH
Credits :01	CIE Marks:30	Duration of SEE: 02Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Get students proficient in both receptive and productive skills especially virtuall 2. Enable students to understand the importance and method of exchanging information in a formal space- both written and spoken 3. Introduce students to an ideal structure for a presentation and discussion- individually and in groups 4. Develop and improve reading skills needed for college work and reproduce the content based on the situational need.	At the end of the course the learners will be able to: 1. Introduce themselves effectively and converse in a formal environment especially in the online space 2. Write emails with appropriate structure and content 3. Use appropriate structure based on the content employing appropriate transitions in written and spoken communication 4. Paraphrase content and write an effective summary

Unit 1:   Delightful Descriptions
1.1 Introductions on an Online Forum
1.2 Making Observations and Giving Opinion
3. Recalling and Describing

Unit 2:   Formal Conversation Skills
2.1 Ask for Information
2.2 Give Information
2.3 Give Feedback
2.4 Seek Permission

Unit 3: Technical Expositions and Discussions
3.1 Classification
3.2 Sequence
3.3 Compare and Contrast
3.4 Cause and Effect
3.5 Problem and solution

Unit 4: Rational Recap
4. Paraphrasing – Written
a. Summarizing – Written
b. Paraphrasing – Spoken
c. Summarizing – Spoken

**METHODOLOGY
ASSESSMENTS**

- Case Studies   - Online assignments
- Demonstration   - Individual and Group
- Presentations
- Expert lectures
- Writing and Audio-visual lessons

Learning Resources:

learn.talentsprint.com

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

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	20
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	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-II (APTITUDE-I)
SYLLABUS FOR B E III Semester

L:T:P(Hrs/week):2:0:0	SEE Marks:40	Course Code: U21BS340MA
Credits :01	CIE Marks:30	Duration of SEE: 03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to:	At the end of the course the learners will be able to:
1. Students will be trained to enhance their employability skills.	1. Solve questions in the mentioned areas using shortcuts and smart methods.
2. Students will be introduced to higher order thinking and problem solving skills in the following areas – Arithmetic Ability, Numerical Ability and General Reasoning.	2. Understand the fundamentals concept of Aptitude skills.
3. Students will be trained to work systematically with speed and accuracy while problem solving.	3. Perform calculations with speed and accuracy.
4. Students will be trained to apply concepts like percentages and averages to solve complex problems.	4. Solve complex problems using basic concepts.
5. Students will be trained to use effective methods like elimination of options and shortcuts to solve problem accurately.	5. Use shortcuts with ease for effective problem solving.

UNIT 1: QUANTITATIVE APTITUDE – NUMERICAL ABILITY
1.1 Introduction to higher order thinking skills
1.2 Speed Math
1.3 Number systems
1.4 LCM & HCF

UNIT 2: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY FOUNDATION
2.1 Ratio proportions
2.2 Partnership
2.3 Ages
2.4 Allegations and mixtures

2.5 Averages

UNIT 3: QUANTITATIVE APTITUDE- WORD PROBLEMS PART 1
3.1 Percentages
3.2 Profit and loss

UNIT 4: REASONING ABILITY- GENERAL REASONING PART 1
4.1 Blood Relations
4.2 Number Series
4.3 Coding and decoding

UNIT 5: QUANTITATIVE APTITUDE- WORD PROBLEMS PART 2
5.1 Time and Work
5.2 Chain Rule
5.3 Pipes and Cisterns

Prescribed textbook for theory:
1. Quantitative Aptitude S.CHAND by Dr. R S Aggarwal
2. A Modern Approach to Verbal & Non-Verbal Reasoning S.CHAND by Dr. R S Aggarwal

Suggested Reading
1. Learn.talentsprint.com/References Courses
2. Quantitative Aptitude Disha Publications
3. LOGICAL Reasoning Disha Publications

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

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	20
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
MECHANICS OF MATERIALS LAB

SYLLABUS FOR B.E. III-SEMESTER

L :T:P (Hrs./week)0 : 0 : 2	SEE Marks:50	Course Code: U21ES311CE
Credits : 1	CIE Marks:30	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*
5. Determine the properties of materials under the action of various loads. 6. Learn the ability to work in a team and make effective presentations.	1. Determine Young's Modulus of materials of beams by conducting deflection test. 2. Assess the quality of materials by conducing hardness test and impact test and also learn the operation of universal testing machine (UTM). 3. Determining modulus of rigidity of materials by conducting torsion test and spring test. 4. Practise working as a team member and lead a team. 5. Demonstrate professional 44enture44 in conducting the experiments and presenting the results effectively.

List of Experiments
1. Determination of Young's modulus by conducting Deflection test on Cantilever beam
2. Determination of Young's modulus by conducting Deflection test on Simply supported beam
3. Izod Impact test
4. Direct tension test on metal rods
5. Brinnell and Rockwell Hardness test
6. Compression test on brittle and ductile materials
7. Determination of modulus of rigidity by conducting tension test on a helical spring

8. Determination of modulus of rigidity by conducting compression test on a helical spring
9. Determination of modulus of rigidity by conducting torsion test
10. Determination of modulus of elasticity by conducting deflection test on fixed beam
11. Determination of modulus of elasticity by conducting deflection test on continuous beam
12. Bend test on metal rod.

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 COMPUTER SCIENCE ENGINEERING

PROGRAMMING FOR ENGINEERS LAB
SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code :U21ES311CS
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES *In this subject the students will*	**COURSE OUTCOMES** On completion of the course, students will be able to
1. understand the fundamentals of programming in C Language 2. write, compile and debug programs in C. 3. formulate solution to problems and implement in C. 4. effectively choose programming components to solve computing problems.	1. choose appropriate data type for implementing programs in C language. 2. design and implement modular programs involving input output operations, decision making and looping constructs. 3. implement search and sort operations on arrays. 4. apply the concept of pointers for implementing programs on dynamic memory management and string handling. 5. design and implement programs to store data in structures and files.

Programming Exercise:
1. Programs to illustrate operators
2. Programs to illustrate selection control statements
3. Programs to illustrate loop control statements
4. Programs to illustrate nested loop control statements.
5. Programs to illustrate functions and recursion
6. Programs to illustrate one dimensional arrays, searching and sorting.
7. Programs to illustrate two dimensional arrays
8. Programs on pointers
9. Functions for string manipulations.
10. Programs on structures and unions.
11. Finding the number of characters, words and lines of given text file.
12. File handling programs.

Learning Resources:

1. Forouzan B.A & Richard F. Gilberg, A Structured Programming Approach using C, 3rd Edition(2013), Cengage Learning.
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition (2006), Prentice-Hall.
3. Steve Oualline, Practical Cprogramming,3rd Edition(2006),O'Reilly Press.
4. Balagurusamy E, Programming in ANSI C, 4th Edition(2008), TMG.

No. of Internal Test:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 120 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of Mechanical Engineering
APPLIED THERMODYNAMICS LAB
SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: U21PC311ME
Credits :01	CIE Marks:30	Duration of SEE: 03Hours

COURSE OBJECTIVES *The objective of the course is to*	COURSE OUTCOMES *On completion of the course, students will be able to*	
perform experiments on various types of I.C Engines, Two-stage reciprocating air compressor and also to conduct experiments on Viscometer and flash and fire point apparatus.	1	determine the volumetric efficiency and isothermal efficiency of a two-stage reciprocating air compressor.
	2	draw the port timing diagram of two stroke petrol engine and valve timing diagram of four stroke diesel engine.
	3	evaluate the performance of internal combustion engines and to prepare a heat balance sheet.
	4	determine absolute and kinematic viscosities of a given lubricating oil using Redwood Viscometer-I.
	5	determine the flash and fire points of a given fuel using Cleveland's Apparatus.

List of Experiments:

1. To determine volumetric efficiency, isothermal efficiency and mass flow rate of a two stage reciprocating air compressor.
2. To study the constructional details of four stroke petrol and diesel engines.
3. To draw port timing diagram of a two stroke Petrol engine.
4. To draw valve timing diagram of a four stroke Diesel engine.
5. To conduct performance test on single cylinder Diesel engine.
6. To conduct heat balance test on a single cylinder Diesel engine.
7. To conduct performance test on multi-cylinder Petrol engine.
8. To conduct performance test on a two-stroke Petrol engine.
9. To conduct performance test on twin-cylinder Diesel engine.
10. To study the performance of a Petrol engine under different compression ratios.
11. To conduct Morse test on multi cylinder Petrol engine.

12. To study Exhaust gas analysis of Diesel engine for carbon deposits using smoke meter.
13. To determine the viscosity of a given lubricating oil.
14. To determine the flash and fire points of a diesel.

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

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-21)
B.E. – MECH : FOURTH SEMESTER (2022-2023)

		B.E (MECH) IV 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								
U21BS410MA	Numerical Methods, Probability & Statistics	3	-	-	3	60	40	3
U21ES410EE	Basic Electrical and Electronics Engineering	3	-	-	3	60	40	3
U21ES410CS	Principles of Data Structures	3	-	-	3	60	40	3
U21PC410ME	Fluid Mechanics and Hydraulic Machines	3	-	-	3	60	40	3
U21PC420ME	Machine Drawing	2	-	2	3	60	40	3
U21OE4XXXX	Open Elective II	3	-	-	3	60	40	3
U21BS440MA	Skill Development-III (Aptitude-II)	1	-	-	2	40	30	1
U21PE430ME	Skill Development-IV (Technical Skills-I) (CADD and Introduction to Solid Modeling)	1	-	-	2	40	30	1
PRACTICALS								
U21ES411EE	Basic Electrical and Electronics Engineering Lab	-	-	2	3	50	30	1
U21PC411ME	Fluid Mechanics and Hydraulic Machines Lab	-	-	2	3	50	30	1
U21ES411CS	Principles of Data Structures Lab	-	-	2	3	50	30	1
TOTAL		**19**	**-**	**8**		**590**	**390**	**23**
GRAND TOTAL		**27**				**980**		**23**

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF MATHEMATICS

NUMERICAL METHODS, PROBABILITY & STATISTICS
SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week): 3+1	SEE Marks:60	Course Code: U21BS410MA
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	**At the end of the course students will be able to:**
1 Study the methods of interpolation, apply numerical methods to interpolate. 2 Understand numerical differentiation and integrate functions and to solve differential equations using numerical methods . 3 Understand Random variables Probability Distributions. 4 Understand tests of hypothesis for large and small samples 5 Study the method to fit different curves to a given data, how Correlation between variables can be measured.	1. Apply numerical methods to interpolate. 2. Solve problems using numerical differentiation using interpolation approach and differential equations using numerical methods. 3. Apply various probability distributions to solve practical problems. 4. Estimate unknown parameters of populations and apply the tests of hypotheses for large and small samples. 5. Solve problems to fit various curves to the given data using curve fitting, and also to find co-efficient of correlation and to determine regression lines and their applications.

UNIT –I (10 Hours)
Interpolation:
Finite Differences- Interpolation- Newton's Forward and Backward Interpolation Formulae – Interpolation with unequal intervals – Lagrange's Interpolation Formula – Divided differences – Newton's Divided difference formula.

UNIT –II (10 Hours)
Numerical Solutions of ODE:
 Numerical Differentiation –Interpolation approach- Numerical Solutions of Ordinary Differential Equations of first order – Taylor's Series Method – Euler's Method – Runge-Kutta of 4th order(without proofs)

UNIT-III (10 Hours)

Probability Distribution:
Random Variables – Discrete and Continuous Random variables-Properties-Distribution functions and densities - Normal Distribution-Properties-Standard normal variate.

UNIT-IV(12 Hours)
Test of Hypothesis:
 Introduction –Testing of Hypothesis- Null and Alternative Hypothesis – Errors- -Level of Significance – Confidence Intervals-Tests of Significance for small samples – t-test for single mean – F- test for comparison of variances – Chi-square test for goodness of fit – Introduction to Design of experiments.

UNIT-V (10 Hours)
Curve Fitting:
Curve fitting by the Method of Least Squares – Fitting of Straight line-Second order curve (parabola) – Exponential curve- -Correlation – Karl Pearson's Co-efficient of Correlation.

Text Books:
1   R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
2   Higher Engineering Mathematics, Dr.B.S Grewal   40th Edition, Khanna Publishers.
3   Probability, Statistics and Random Processes, T. Veerarajan , Tata MCGraw Hill Education Private Ltd.

Reference Books:
1   Advanced Engineering Mathematics, Kreyszig E, 8 th Edition, John Wiley & Sons Ltd, 2006.
2   A text book of Engineering Mathematics by N.P.Bali & Manish Goyal, Laxmi Publication.
3   Fundamentals of Mathematical Statistics, Gupta & Kapoor, Sultan chand & sons, New Delhi.

Online Resources:
1   **http://mathworld.wolfram.com/topics**
2   **http://www.nptel.ac.in/course.php**

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

1	No. of Internal	:	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	:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of Electrical & Electronics Engineering

Basic Electrical and Electronics Engineering
SYLLABUS FOR B.E IV – SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U21ES410EE
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	On completion of the course, students will be able to
The objective of this course is to provide an understanding of Electronic Devices, Linear and Digital circuits, enhancing the ability to solve the problems using fundamental concepts of AC circuits, three phase connections, principle of operation of Transformers, DC machines and AC machines.	1. Apply the fundamental concepts to solve the problems in single phase and 3 phase AC circuits. 2. Analyze the behaviour of ransformer and demonstrate the principle of operation and performance characteristics of DC Machines. 3. Select suitable three phase induction motor and also interpret speed control method for different applications. 4. To understand the Electronic devices, Operational Amplifier Fundamentals & OP-AMP Linear Applications. 5. Understand the number system, different codes, and code conversion and Design different combinational circuits.

Unit-I
Electrical Circuits:
Ohm's law, KCL, KVL, single phase AC circuit fundamentals, power, power factor, 3 phase AC circuits–star and delta Connection.

Unit-II
DC Machines: Construction and principle of operation, classification, back emf, torque equation, speed torque characteristics, losses and efficiency, speed control of DC motor, applications.

AC Machines:
1. φ Induction Motor: operating principle of split phase, capacitor start & capacitor run induction motor.
2. - φ Induction Motor: construction, principle of operation, torque equation, speed torque characteristics.
Single phase Transformers: Types of transformer, construction and working principle.

Unit- III
Electronic Devices and Circuits: Operation and V–I characteristics of PN junction diode, BJT, MOSFET and SCR, applications. Half wave and full wave uncontrolled rectifier, basic filters.

Unit – IV
Linear Integrated Circuits: Operational amplifiers, ideal op – amp characteristics, inverting and noninverting
amplifier. Op – amp applications: adder, subtractor, integrator, differentiator, comparator, zero crossing detector.

Unit – V
Digital Electronics: Number systems, logic gates, half adder, full adder, parallel adder/ subtractor, flipflops – RS, JK, T and D.

Learning Resources:
1. Mehta. V.K and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Co. Limited, New Delhi, 2006.
2. Muthusubramanian. R, Salivahanan. Sand Muraleedharan. K.A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw-Hill Publishers, 2006.
3. MurugeshKumar. K, "Basic Electrical Science and Technology", Vikas Publishing Limited, 2011.
4. Roy Choudhury and ShailJain, "Linear Integrated Circuits", New Age International Limited, 2003.
5. Leach. D. P, Malvino. A.P and Goutam Saha, "Digital Principles and Applications", Tata McGraw –Hill, 2008.

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 Computer Science & Engineering

PRINCIPLES OF DATA STRUCTURES
SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : U21ES410CS
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 Identify and use appropriate data structure for a given problem.	1 Design a solution to a given problem using arrays and linked list.
	2 Develop an application using stacks and queues.
2 Describe the linear and nonlinear data structures.	3 Choose the appropriate nonlinear data structure and perform various operations on trees.
	4 Explain the various operations on graphs.
	5 Choose appropriate searching and sorting techniques for a given set of data. Analyze the time and space complexities of Algorithms.

UNIT – I
Introduction: Data types, Data Structures, Types of Data Structures.
Arrays: Arrays – operations
Linked Lists: Singly Linked Lists, Circularly linked lists, Doubly Linked Lists.

UNIT – II
Stacks: Array Representation, Linked Representation, Applications**.**
Queues: Array Representation, Linked Representation, Applications.

UNIT – III
Trees: Introduction – terminology, representation of Trees Definitions, Binary trees-Properties of Binary trees, Binary Tree Representations, Binary Tree Traversals-Inorder Traversal, Preorder Traversal and Postorder Traversal

UNIT-IV
Graphs: Introduction, Definitions, Graph Representations, Elementary Graph operations-Depth first search, Breadth first search

UNIT-V:
Searching and Sorting: Linear search, binary search, bubble sort, selection sort and insertion sort, Quick sort.

Performance analysis: Time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations

<u>**Learning Resources:**</u>
1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition(2008), Universities Press
2. Mark A Weiss, Data Structures and Algorithm Analysis In C, Second Edition(2002), Pearson
3. Kushwaha D. S and Misra A.K, Data structures A Programming Approach with C, Second Edition(2014), PHl.,
4. Gilberg R. F and Forouzan B. A, Data structures: A Pseudocode Approach with C, Second Edition(2007), Cengage Leaming
5. Tanenbaum A. M , Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
6. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Third Edition(2009), MIT Press
7. Yedidyah Langsam , Moshe J. Augenstein ,Aaron M. Tenenbaum, Data Structures Using C and C++ , Second Edition(2009), PHI

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 Mechanical Engineering

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

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U21PC410ME
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES *The objectives of the course are to*	COURSE OUTCOMES *On completion of the course, students will be able to*	
understand properties of fluids, fluid flows, conservation equations, flow through pipes, boundary layer flows, flow separation, hydrodynamic forces on vanes / blades, performance of fluid machines.	1	identify importance of various fluid properties at rest and in transit and Solve problems involving fluid properties and shear forces resulting from Newtonian fluids
	2	derive and analyze fluid systems using the continuity, momentum, impulse momentum, and energy equation for various fluid flows.
	3	distinguish laminar and turbulent flows through pipes and understand the concept of boundary layer theory and flow separation
	4	estimate force on vanes and efficiencies of turbine under different operating conditions
	5	describe working of pumps and evaluate performance characteristics

UNIT-I
Properties of Fluids: Introduction to fluid mechanics, definition of fluid and flow, continuum fluid, fluid and flow properties; Newtonian and non–Newtonian fluids, ideal and real fluids; vapour pressure, compressibility, surface tension;

Fluid Statics: pressure at a point, Pascal's law, atmospheric pressure, absolute, gauge and vacuum pressures, simple and differential manometers.

UNIT-II
Fluid Kinematics: Lagrangian and Eulerian approach for fluid flow; Classification of fluid flows: steady and unsteady flows, uniform and non-uniform flows; velocity and acceleration in a flow; stream line, path line, streak line, rotational and irrotational flows, velocity potential and stream function, Laplace equation, Poission equation;

Fluid Dynamics: mass, momentum and energy conservation laws; continuity equation in Cartesian coordinate system, forces acting in fluid flows, Euler equation and Bernoullie equation venturimeter, orificemeter.

UNIT-III
Laminar Flow in Pipes: Reynolds experiment, steady flow in circular pipes, Hagen–Poiseuille equation.
Turbulent Flow in pipes: introduction, head loss – major (Darcy–Weisbach equation) and minor losses.

Boundary Layer flows: formation and its thickness, displacement, momentum and energy thickness, separation of boundary layer;

UNIT-IV
Impact of Jets: Principle of impulse momentum, Hydrodynamic force on stationary and moving blades (flat and curved), velocity triangles, work done and efficiency.
Hydraulic Turbines: layout of hydraulic power plant, working principle of Pelton, Francis and Kaplan turbines, velocity triangles, work done, efficiencies, specific speed, unit quantities, model parameters for turbines, draft tube, functions and types; cavitation.

UNIT-V
Centrifugal Pumps: Classification, working principle, velocity triangles, types of head, work done, efficiencies, minimum starting speed, specific speed, unit quantities.
Reciprocating pumps: Classification, working principle, single and double acting pumps, discharge, work done and power, slip, pressure head in the suction and delivery pipes, indicator diagrams, Air vessels.

Learning Resources:

1. Frank M White, "Fluid Mechanics", Tata McGraw-Hill, 7th Edition, 2012
2. Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics including Hydraulics Machines", Standard Book House, Delhi, 2015.
3. D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering" S.K. Kataria & Sons, Re-print 2014
4. Robert W. Fax, Philip J. Pritchard, Alan T. McDonald "Introduction to Fluid Mechanics", Wiley India Edition. (Wiley Student Edition Seventh 2011).
5. R.K. Bansal, "Fluid Mechanics and Hydraulic Machines", Lakshmi Publications, 2010.

Web Resources:

1. http://nptel.ac.in/courses/112105171/
2. http://nptel.ac.in/courses/112106190/
3. http://nptel.ac.in/video.php?subjectId=105101082
4. http://web.mit.edu/hml/ncfmf.html
5. http://ocw.uci.edu/courses/engineering_mae_130a_intro_to_fluid_mechanics.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

MACHINE DRAWING
SYLLABUS FOR B.E.IV-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U21PC420ME
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE The objective of the course is to	COURSE OUTCOMES On completion of the course, students will be able to
learn drawing fundamentals, orthographic projections of machine components, and their dimensional proportions and prepare assembly drawings.	1 conversion of pictorial views into orthographic views by interpreting the conventions used in machine drawing using first angle projection method.
	2 sketch the fasteners and riveted joints with suitable proportions to learn their details.
	3 sketch the rod joints, keys, shaft couplings and bearings with suitable proportions.
	4 prepare the assembly drawings of steam engine parts from the detailed drawings.
	5 Prepare the assembly drawings of tail stock and tool post etc from the detailed drawings.

Unit-I: Introduction
Format of drawing sheet, title block and part list, conventions of drawing lines and dimensions, First and third angle projection methods, scales as per ISO standards, convention for sectional views. Orthographic projections including sectional views of simple machine elements.

Unit-II: Drawing/Sketching of Various views of
Screwed Fasteners: Screw thread nomenclature, forms of threads, thread series, thread designation, multi- start threads, right and left-hand threads, representation of threads and thread parts in assembly.
Fasteners: Bolted joint, hexagonal nut, square nut, hexagonal and square headed bolts, washer.
Other Bolts: Square headed bolt with square neck, T-headed bolt with square neck, stud bolt.

Other nuts: Flanged nut, Cap nut, Dome nut, Capstan nut, Ring nut and Wing nut.

Locking arrangement for nuts: Using lock nut, split pin, castle nut, Wile's lock nut,set screw, grooved nut, Locking by screw, by plate and by spring washer.

Riveted Joints: Rivets and Riveting, Caulking and Fullering, rivet heads, Definition of terms. Classification of riveted joints: Lap joints and butt joints with proportions.

Unit-III: Drawing/Sketching of various views of

Keys: Saddle keys, sunk keys, Splines, Woodruff key and round keys

Cotter joints: Cotter joint with sleeve, cotter joint with socket and spigot ends, cotter joint with a gib.

Pin Joint: Knuckle joint

Shaft couplings: Rigid Couplings: Sleeve (muff), Butt muff, Half-lap muff, Split-muff.

Flanged Couplings: Flanged Coupling, Protected type flanged coupling, Solid flanged coupling.

Flexible Couplings: Bushed pin type flanged coupling.

Non-aligned couplings: Universal coupling and Oldham's coupling.

Shaft bearings: Journal bearings: Solid journal bearing, bushed journal bearing, Pedestal bearing and Pivot bearing.

Unit-IV: Assembly Drawings of

Engine parts: stuffing box, steam engine cross head(horizontal), vertical cross head, connecting rod end and eccentric.

Unit-V: Assembly Drawings of

Machine tool parts: Single tool post and Lathe tail stock.

Accessories: Screw jack and Pipe vice.

Learning Resources:

1. N.D. Bhatt, "Machine Drawing, 28th Edition, Charotar Publishing house, Anand, New Delhi, 1994.
2. N. Siddeshwar, "" Machine Drawing", 5th Edition, Tata Mc Graw Hill Publishing Co. Ltd., 1994
3. K.L. Narayana, P.Kannaiah, K.Venkat Reddy, "Machine Drawing", 2nd Edition, New Age International (P) Ltd., 1999.
4. K.C. John, "Text book of Machine Drawing", PHI Learning, 2010.
5. Ajeet Singh, "Machine Drawing includes Autocad", 2nd Edition, Mc Graw Hill Education, 2014.

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

B.E- IV SEM OPEN ELECTIVE-II COURSES			
Dept.	**Title**	**Code**	**Credits**
MECH	Optimization Methods	U21OE410ME	3
CIVIL	Disaster Management	U21OE410CE	3
ECE	Mathematical Programming for Engineers	U21OE410EC	3
	Introduction to Communication Systems	U21OE420EC	3
EEE	Mathematical Programming for Numerical Computation	U21OE410EE	3
IT	Introduction to Object Oriented Programming	U21OE410IT	3
	Introduction to Scripting Languages	U21OE420IT	3
HSS	Critical Thinking	U21OE430EH	3

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
OPTIMIZATION METHODS (Open Elective-II)

Instruction : 3Hrs /week	SEE Marks : 60	Course Code : U21OE410ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: understand Linear & non-linear programming, transportation modeling , CPM & PERT for project scheduling and control, and application of various optimization techniques for respective field engineering (Inter disciplinary)	On completion of the course, the student will be able to: 1. Optimization of resources in multi disciplinary areas through linear programming under different conditions. 2. Understand revised simplex methods per customer requirements to suit for various Organizations. 3. Minimization of total cost to apply for transportation techniques for the transhipment of Goods and products and Implement techniques like project management 4. Optimization of resources in multi disciplinary areas through non-linear programming under different conditions.

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

UNIT-II
Advanced topics in Linear programming
Special cases in simplex method, Duality in LPP, Differences between primal and dual, shadow prices, Dual simplex method, Revised simplex method.

UNIT-III
Transportation Model
Introduction to Transportation model-Formulation and solution of transportation models- Methods for calculating Initial basic feasible solution-Optimization of transportation model using MODI method.
Project Scheduling

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

UNIT-IV
Non linear programming problems
Optimization methods for single variable, multivariable functions, Maxima-Minima

One Dimensional Minimization: Uni-modal Function, Unrestricted search, Exhaustive search,Dichtomous search, Interval Halving method, Fibonacci and golden bisection Method , Newton and Quasi Newton method.

UNIT-V
Non Linear - Unconstrained optimization: classification, Univariate search, pattern Directions, Hook Jeeves, Powel method, steepest decent method.

Learning Resources:
1. SingiresuS.Rao, "Engineering optimization- Theory and Practice", 4thEdition, John Wiley and Sons, 2009.
2. NVS Raju, "Optimization methods for Engineers ", PHI Learning Pvt. Ltd., 2014.
3. Prem Kumar Gupta and Dr. DS Hira, "Operations Research ", S.Chand& Company Pvt. Ltd., 2014.
4. R. Paneerselvam, "Operations Research", PHI Learning Pvt Ltd., 2009.
5. Kalyanmoy Deb, Optimization for Engineering Design- algorithms and examples, PHI pvt ltd, 1st edition 2003, Delhi.

The break-up of CIE: Internal Tests+ Assignments + Quizzes
1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENTOF CIVILENGINEERING
DISASTER MANAGEMENT (Open Elective-II)
SYLLABUS FOR B.E.IV-SEMESTER

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U21OE410CE
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES Objectives of this course are to:	COURSE OUTCOMES Upon the completion of this course the students will be expected to:
1. Know about the state of art of disaster management in world and explore the history of the disasters and comprehend how past events have helped shape the future. 2. Study the various natural and manmade disasters and apply the mitigation measures 3. Expose students to various technologies used for disaster mitigation and management.	1. Attain knowledge on various types, stages, phases in disaster with international & national policies and programmes with reference to the disaster reduction. 2. Understand various types of natural disaster, their occurrence, Effects, Mitigation and Management Systems in India 3. Understand different types of manmade disasters, their occurrence, Effects, Mitigation and Management Systems in India. 4. Explain the utility of geography information systems (GIS), Remote sensing technology in all phases of disaster mitigation and management. 5. Understand the Role of Remote Sensing and Geographical Information Systems (GIS) in

UNIT-I
Introduction: Hazard, vulnerability and risk, Types of disasters, Disaster management cycle, Progress of disaster management in world, vulnerability profile of India, Disaster management act, Disaster management in India

UNIT-II
Natural Disasters – **Hydro- meteorological based disasters**: Tropical cyclones, floods, drought and desertification zones - Causes, Types, effects and Mitigation measures.

UNIT-III
Natural Disasters – **Geographical based disasters**: Earthquake, Tsunamis, Landslides and avalanches – Causes, Types, effects and Mitigation measures.

UNIT-IV
Human induced hazards: Chemical industrial hazards, major power breakdowns, traffic accidents, etc. UNEP initiative- Ecosystem based disaster risk reduction (Eco-DRR) and Partnership of Environment and Disaster Risk Reduction (PEDDR)

UNIT-V
Role of Remote Sensing and Geographical Information Systems (GIS) in Disaster Management: Introduction to remote sensing and GIS, its applications in disaster management.

Learning Resources:
1. Rajib, S and Krishna Murthy, R.R.(2012) "Disaster Management Global Challenges and Local Solutions", Universities Press, Hyderabad, 2012.
2. Navele, P & Raja, C.K. (2009), Earth and Atmospheric Disasters Management, Natural and Manmade, B.S. Publications, Hyderabad, 2009.
3. Battacharya, T. Disaster Science and Management, Tata McGraw Hill Company, New Delhi, 2012.

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 ELECTRONICS AND COMMUNICATION ENGINEERING

MATHEMATICAL PROGRAMMING FOR ENGINEERS
(Open Elective-II)
SYLLABUS FOR B.E. IV – SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U21OE410EC
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 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 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 Communication Systems (Open Elective)
SYLLABUS FOR B.E. IV – SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U21OE420EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Distinguish between Amplitude and Frequency modulation methods and their application in Communication Receivers 2. Explain why multiplexing methods are necessary in communications and compare FDM with TDM 3. Compare and contrast FSK and BPSK modulation schemes employed in digital data transmission 4. Draw the block diagrams of different types of communication systems and explain their operation	On completion of the course, students will be able to 1. Identify the Radio frequency spectrum and the bands of different types of radio systems 2. Analyze the power, efficiency and transmission bandwidth of Amplitude and Frequency Modulated signals. 3. Convert the Radio frequency to Intermediate frequency and explain the operation of Superheterodyne Receiver. 4. Compare and contrast Frequency Division Multiplexing and Time Division Multiplexing used in the Communication systems 5. Detect and correct errors present in bit stream data using parity check 6. Explain the basic principles of different types of communication systems.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1													
CO2	3														
CO3	3	1													
CO4	3														
CO5	2	1													
CO6	3														

UNIT - I :
Introduction to Electronic Communication: Communication systems, Types of Electronic Communication, Modulation and Multiplexing, The Electromagnetic Spectrum, Bandwidth, Communication Applications, Gain and Attenuation definitions
Amplitude Modulation Fundamentals: AM concepts, Modulation Index and Percentage of Modulation, Sidebands and the Frequency Domain, AM Power

UNIT - II :
Fundamentals of Frequency Modulation: Basic principles of Frequency Modulation, Principles of Phase Modulation, Modulation Index and Sidebands, Noise – Suppression Effects of FM, Frequency Modulation verses Amplitude Modulation.
Communication Receivers: Basic Principles of Signal Reproduction, Superheterodyne Receivers, Frequency Conversion, Intermediate Frequency and Images, Noise.

UNIT - III :
Digital Communication Techniques: Digital Transmission of Data, Parallel and Serial Transmission, Data Conversion, Pulse Modulation.
Multiplexing and De-multiplexing: Multiplexing Principles, Frequency Division Multiplexing, Time Division Multiplexing, PCM Multiplexing.

UNIT - IV :
Transmission of Binary Data in Communication Systems: Digital Codes, Principles of Digital Transmission, Transmission Efficiency, Modem Concepts and Methods – FSK, BPSK, Error Detection and Correction

UNIT - V :
Different Types of Communication Systems: Microwave Concepts, Optical Principles, Optical Communication System, Satellite Communication Systems, Satellite Orbits, Cellular Telephone Systems, Bluetooth and Wi-Fi basics
Learning Resources:
1. Louis E. Frenzel, Principles of Electronic Communication Systems, 3rd Edition. Tata Mcgraw Hill.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, Pearson Education.
3. https://nptel.ac.in/syllabus/syllabus.php?subjectId=117102059
4. https://nptel.ac.in/courses/117101051/12

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 ELECTRICAL AND ELECTRONICS ENGINEERING

Mathematical Programming for Numerical Computation
(Open Elective-II)
SYLLABUS FOR B.E. IV SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code:U21OE410EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	On completion of the course, students will be able to
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.

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(GUI): 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 RudraPratap, Oxfordpublications.
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 Mathworks.
4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by

Timmy SiauwAlexandreBayen,Elsevier-18th April2014.
5. https://nptel.ac.in/courses/103106118/2

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 OBJECT ORIENTED PROGRAMMING
(Open Elective-II)
SYLLABUS FOR B.E. IV SEMESTER

L:T:P (Hrs/week):3:0:0	SEE Marks: 60	Course Code: **U21OE410IT**
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
	On completion of the course, students will be able to
Explain the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, building simple GUI applications.	1. Understand fundamental concepts in Object oriented approach. 2. Develop object-oriented programs using the concepts of exception handling and multi threading. 3. Demonstrate the usage of Java I/O streams to handle user input and output. 4. Design and develop GUI programs. 5. Develop Applets for web applications.

UNIT- I
Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables-scope and lifetime, Operators, Control statements, Structure of a Java class, Classes, Methods, Inheritance, and Command Line Arguments.
Arrays: One-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two-dimensional arrays.
Packages: Creation, importing a package and user defined package.
Interfaces: Defining interfaces, extending interfaces, implementing interfaces.

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

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

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

UNIT- IV

Introducing AWT working with Graphics: AWT Classes, Working with Graphics.

Event Handling: The Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces.

Awt Controls: Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, CheckboxGroup, Choice Controls, Using Lists, Managing Scroll Bars, Using TextField, Using TextArea, Understanding Layout Managers, Menu bars and Menus, Dialog Boxes, FileDialog, Exploring the controls, Menus ,and Layout Managers.

UNIT- V

Applet Programming: Introduction, how applets differ from applications, building applet code, applet life cycle, HTML-APPLET tag, passing parameters to applets.

Learning Resources:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th edition, McGraw Hill Publishing, 2010.
4. Y. Daniel Liang , An Introduction to JAVA Programming, Tata McGraw Hill, 2009.
5. Kathy Sierra, Head First Java, 2/e, Shroff Publishers, 2012.
6. Error! Hyperlink reference not valid.
7. Error! Hyperlink reference not valid.

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 SCRIPTING LANGUAGES
(Open Elective-II)
SYLLABUS FOR B.E. IV SEMESTER

| L:T:P(Hrs./week): 3:0:0 | SEE Marks: 60 | Course Code :**U21OE420IT** |
| Credits   : 3 | CIE Marks: 40 | Duration of SEE : 3 Hours |

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
This course will enable the students to acquire basic skills for writing python scripts.	1. Write a python script to solve a basic problem using structured programming constructs 2. Write a python script to solve a basic problem using object oriented programming constructs 3. Create and use python modules 4. Handle file related operations 5. Encode and decode strings

Unit – I
Introduction to Python, running a python script, writing comments, using variables, operators, strings and text, format specifiers , printing information. passing command line arguments, prompting users, parameters, unpacking variables.

Unit – II
Decision making : if and else if, repetition : while loops and for loops, lists, operations on list , tuples, operations on tuples, sets, operations on sets, dictionaries, operations on dictionaries.

Unit – III
Defining functions, passing arguments to functions , returning values from functions, Exception handling.

Unit – IV
Modules , Classes and Objects, is – a relationship : inheritance, has-a relationship : composition.

Unit – V

File handling, serialization using JSON and pickle, encoding and decoding.

<u>Learning Resources</u>
1. Allen B. Downey, Think Python, 2nd Edition, Green Tea Press
2. "Learning Python", 5th Edition, O'reilly
3. https://www.python.org
4. https://nptel.ac.in/courses/106106182/

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 THINKING
(Open Elective-II)
SYLLABUS FOR B E IV Semester

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U21OE430EH
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to:	At the end of the course the learners will be able to:
1. Identify the core skills associated with critical thinking.	1. Analyse and compare techniques for comparing alternate solutions
2. Comprehend the various techniques of critical thinking	2. Demonstrate the difference between deductive and inductive reasoning and construct logically sound arguments
3. Evaluate data and draw insights from it to make the right decisions	3. Check for accuracy of data and use it as a tool for problem solving
4. Understand where to look for bias and	4. Evaluate, identify and distinguish between relevant and irrelevant information to formulate a thesis or hypothesis.
5. assumptions in problem	5. Employ evidence and information effectively
6. Understand structure, standards and ethics of critical writing	

UNIT 1: COMPONENTS OF CRITICAL THINKING
1.1 Applying Reason
1.2 Open Mindedness
1.3 Analysis
1.4 Logic

UNIT 2: NON-LINEAR THINKING
2.1 Step out of your Comfort Zone
2.2 Don't Jump to Conclusions
2.3 Expect and Initiate Change
2.4 Being Ready to Adapt

UNIT 3: LOGICAL THINKING
3.1 Ask the Right Questions
3.2 Organize Data
3.3 Evaluate Information
3.4 Draw Conclusions

UNIT 4: INFER MEANING FROM INFORMATIVE TEXTS
4.1 Making Assumptions
4.2 Watch out for Bias
4.3 Ask Clarifying Questions
4.4 SWOT Analysis

UNIT 5: PROBLEM SOLVING
5.1 Identifying Inconsistencies
5.2 Trust your Instincts
5.3 Asking Ask?

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

LEARNING RESOURCES

learn.talentsprint.com

1. Calling Bullshit: The Art of Skepticism in a Data-Driven World. by Carl Bergstrom & Jevin West. ...
2. Thinking, Fast and Slow. by Daniel Kahneman. ...
3. Factfulness: Ten Reasons We're Wrong About The World — And Why Things Are Better Than You Think. ...
   Box Thinking: The Surprising Truth About Success. ...

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-III (APTITUDE-II)
SYLLABUS FOR B.E. IV SEMESTER

L: T: P (Hrs/Week):2:0:0	SEE Marks: 40	Course Code: U21BS440MA
Credits: 1	CIE Marks: 30	Duration of SEE: 2 Hours

COURSE OBJECTIVES The course will enable the students to:	COURSE OUTCOMES On completion of the course, students will be able to
1. Students will be trained to enhance their employability skills. 2. Students will be introduced to higher order thinking and problem solving skills in the following areas - Arithmetic Ability, Numerical Ability and General Reasoning. 3. Students will be trained to work systematically with speed and accuracy while problem solving. 4. Students will be trained to apply concepts like percentages and averages to solve complex problems. 9. Students will be trained to use effective methods like elimination of options and shortcuts to solve problem accurately.	1. Solve questions in the mentioned areas using shortcuts and smart methods. 2. Understand the fundamentals concept of Aptitude skills. 3. Perform calculations with speed and accuracy. 4. Solve complex problems using basic concepts. 5. Use shortcuts with ease for effective problem solving.

UNIT 1: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED -1
1.1 Time speed and distance
1.2 Boats and Streams
1.3 Problems on trains

UNIT 2: REASONING ABILITY- LOGICAL REASONING
2.1 Seating Arrangements- Linear; Circular; Complex
2.2 Venn diagrams
2.3 Syllogism
2.4 Cubes & Cuboids
2.5 Dices

UNIT 3: REASONING ABILITY- NON VERBAL REASONING
3.1 Figure Series
3.2 Directions

3.3 Clocks
3.4 Calendars

UNIT 4: QUANTITATIVE APTITUDE- ARITHMETIC ABILITYADVANCED -2
4.1 Mensuration Part -1
4.2 Mensuration Part -2
4.3 Logarithms

UNIT 5: QUANTITATIVE APTITUDE- ENGINEERING MATHEMATICS
5.1 Permutations and combinations
5.2 Probability

Prescribed textbook for theory:
1. Quantitative Aptitude S.CHAND by RS AGARWAL
2. A Modern Approach to Verbal & Non-Verbal Reasoning S.CHAND by Dr. R S Aggarwal

Suggested Reading

1. Learn.talentsprint.com/References Courses
2. Quantitative Aptitude Disha Publications
3. 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   : 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 : 60   Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF MECHANICAL ENGINEERING
SKILL DEVELOPMENT-IV (TECHNICAL SKILL-I)
(CADD & Introduction to Solid Modeling)
SYLLABUS FOR B.E. IV SEMESTER

L: T: P (Hrs/Week):2:0:0	SEE Marks: 40	Course Code: U21PE430ME
Credits: 1	CIE Marks: 30	Duration of SEE: 2 Hours

Unit 1
Introduction to CAD package, Setting up drawing environment, Command and System variables, Coordinate system.
Creating graphic primitives like Point, Line, Arc, Planes, Circle, polygon, Annotation etc.

Unit 2
Creating and editing 2D objects, e.g., quick trim, quick extend, fillet, chamfer, mirror, offset.
Layers and object Properties, Creating dimensions.

Unit 3
Creating 2D sketches using different types of lines, e.g, dotted, axis, and dimension lines.
Developing different 2D sketches.

Unit 4
Working in 3D Space, Creating simple 3D Objects using various commands.
Creating a layout to plot, documents, file formats.

Suggested Reading:
1. Shan Tickoo, Auto CAD 2021: A Problem Solving Approach, Autodesk Press USA.
https://caddexpert.com/nx-3d-modeling-practice-drawings-pdf/

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

1. No. of Internal Tests : 1   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 Tests : 60   Minutes

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

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
SYLLABUS FOR B.E. IV SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks:50	Course Code: **U21ES411EE**
Credits :01	CIE Marks:30	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
	On completion of the course, students will be able to
1. To introduce to students the basics of Electrical and Electronic circuits, electrical machines.	1. To familiarize with the basic experiments on electrical and electronic fundamentals and machines. 2. Design the circuits related to opamps and digital IC's. 3. Able to apply the concepts of electrical and electronics circuits to engineering applications.

List of Experiments:
1. Verification of Ohm's law and Kirchoff's laws.
2. Measurement of power and power factor in single phase R – L – C series circuit.
3. Mechanical characteristics of DC shunt and compound motor
4. Load test on 3 – phase induction motor.
5. Speed control of DC shunt motor.
6. Load test on single phase transformer.
7. V – I characteristics of BJT and MOSFET.
8. Study of half wave and full wave rectifiers with and without filters.
9. Applications of operational amplifier: Adder, subractor, integrator and differentiator.
10. Study of logic gates
11. Implementation of binary half adder and full adder/subtractor.
12. Generation of triangular, sine and square wave using IC's

From the above experiments, each student should perform at least 10 (Ten) experiments.

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

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

Department of Mechanical Engineering

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

L:T:P(Hrs/week):0:0:2	SEE Marks:50	Course Code: U21PC421ME
Credits :01	CIE Marks:30	Duration of SEE:03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
The objective of the course is to	*On completion of the course, students will be able to*
provide practical knowledge in verification of principles of fluid flow while imparting knowledge in measuring pressure, discharge and velocity of fluid flow. Also gain knowledge in performance testing of hydraulic machines.	1. identify whether flow is laminar or turbulent. 2. evaluate the discharge coefficients of various flow measuring devices. 3. determine the coefficient of impact on semi circular vane under constant jet velocity. 4. evaluate the performance of impulse and reaction turbines at constant head. 5. calculate the efficiency of dynamic and positive displacement pumps for various flow rates.

List of Experiments:

1. To determine the type of flow using Reynold's apparatus.
2. To verify Bernoulli's Equation for an incompressible flow.
3. To determine the discharge coefficient of venture meter.
4. To determine the discharge coefficient of orificemeter.
5. To determine the friction factor in pipe flow.
6. To determine the impact coefficient of jet on given vane.
7. To study the performance characteristics of a Pelton wheel at constant head.
8. To study the performance characteristics of a Francis Turbine at constant head.
9. To study the performance characteristics of a Kaplan Turbine at constant head.
10. To study the performance characteristics of a centrifugal pump at constant speed.
11. To study the performance characteristics of a self priming pump at constant speed.

12. To study the performance characteristics of a reciprocating pump at constant speed.
13. To study the performance characteristics of a gear pump at constant speed.
14. To study the performance characteristics of a centrifugal pump at variable speed.

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

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: **3 Hours**			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of Computer Science & Engineering

PRINCIPLES OF DATA STRUCTURES LAB
SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : U21ES411CS
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

Each Department will conduct under Technical Skills

Course Objectives	Course Outcomes
The course will enable the students to:	At the end of the course student will be able to:
Design and implement abstractions of various data structures and their practical applications.	1. Implement operations on vanous arrays and linked list. 2. Implement operations on stacks and queues 3. Implement traversals on binary trees. 4. Choose appropriate searching and sorting techniques for given set of data.

1. Menu driven program that implements arrays for the following operations.
   a) read   b)display   c)insert   d) delete
2. Implementation of Singly Linked List.
3. Implementation of Doubly Linked List,
4. Implementation of Circular Linked list
5. Menu driven program that implements Stacks using arrays for the following operations.
   a) create   b)push   c)pop   d) peek
6. Implementation of Stack using Singly Linked List.
7. Implementation of evaluation of postfix expression using stacks
8. Menu driven program that implements Queues using arrays for the following operations
   a) create   b)insert   c)delete   d) display
9. Implementation of Queue using Singly Linked List
10. Implementation of Recursive Traversals (Preorder, Inorder, Postorder) on binary Trees.
11. Implementation of Linear search and binary search.
12. Implementation of bubble sort, selection sort and insertion sort.

Suggested Reading:

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2/e, Universities Press, 2008
2. Mark A Weiss, Data Structures and Algorithm Analysis In Second Edition (2002), Pearson
3. Richard F, Gilberg, B.A. Forouzan, "Data Structures, A Pseudocode Approach with C", Cengage, 2nd Edition
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stem 'Introduction to Algorithms' 2002.
5. Tanenbaum A. M, Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson
6. Data Structures through C in depth, S K Srivastava, Deepali Srivastava, BPB publications, 2nd Edition

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-21)
B.E. – MECH : BRIDGE COURSE (2022-2023)

Course Code	Name of the Course	Scheme of Instruction Hours per Week			Scheme of Examination			
		L	T	P/D	Duration in Hrs	SEE	CIE	Credits
III-SEMESTER								
THEORY								
UB21ES340CE	Mechanics for Engineers	2	-	-	3	50	-	0
	TOTAL	**2**	**-**	**-**	**-**	**50**	**-**	**0**
IV-SEMESTER								
THEORY								
UB21MC400MA	Matrix Theory & Vector Calculus	2	-	-	3	50	-	0
UB21HS410EH	English Language Communication Skills	2	-	-	3	50	-	0
PRACTICALS								
UB21HS411EH	English Language Communication Skills Lab	-	-	2	3	50	30	0
	TOTAL	**4**	**-**	**2**	**-**	**150**	**30**	**0**
	GRAND TOTAL	**6**			**-**	**180**		**0**

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

DEPARTMENT OF CIVIL ENGINEERING
MECHANICS FOR ENGINEERS
(Civil, Mech., & EEE)

SYLLABUS FOR BRIDGE COURSE B.E. III-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:50	Course Code: UB21ES340CE
Credits : - - -	CIE Marks: - - -	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. To learn the resolution of a system of spatial forces.	1. Judge whether the body under the action of spatial force system.
2. To assess the frictional forces on rigid body.	2. Analyse equilibrium of a body subjected to a system of forces.
3. To understand the concepts of dynamics and its principles.	3. Solve problem of bodies subjected to friction.
4. To explain kinetics and kinematics of particles, projectiles, curvilinear motion and centroidal motion.	4. Distinguish between statics and dynamics and differentiate between kinematics and kinetics.
5. To impart the concepts of work-energy method and its applications to rectilinear translation, centroidal motion.	5. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear motion.

UNIT-I: Force Systems: Components of forces, moments in space and its applications.

UNIT-II: Equilibrium of Force Systems: Free body diagram, Equations of equilibrium, Equilibrium of planar and spatial system.

UNIT-III: Friction: Laws of friction, application to simple systems and wedge friction.

UNIT-IV: Kinematics: Rectilinear motion, curvilinear motion, velocity and acceleration of a particle.

UNIT-V: Kinetics: Analysis as a particle, analysis as a rigid body in translation.
Learning Resources:
1. Singer F.L., "Engineering Mechanics", Harpper & Collins, Singapore,2010.

2. Timoshenko S.P. and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 2014.
3. Andrew Pytel, Jaan Kiusalaas., "Engineering Mechanics", Cengage Learning, 2014.
4. Beer F.P. and Johnston E.R., "Jr. Vector Mechanics for Engineers", TMH, 2004.
5. Hibbeler R.C. & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
6. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
7. Basudeb Bhattacharyya., "Engineering Mechanics", Oxford University Press, 2008.
8. Meriam. J. L., "Engineering Mechanics", Volume-I Statics, John Wiley & Sons, 2008.
9. NPTEL Course (www.nptel.ac.in)
10. Virtual labs (www.vlab.co.in)

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

MATRIX THEORY & VECTOR CALCULUS
SYLLABUS FOR BRIDGE COURSE B.E. IV-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:50	Course Code: UB21BS400MA
Credits : - - -	CIE Marks: - - -	Duration of SEE: 3 Hrs

UNIT-I: (4 Hours)
DIFFERENTIATION & INTEGRATION

Differentiation of standard functions(Formulae) - Partial Derivatives – Derivative of Composite functions and Implicit functions - Chain Rule - Total Derivative
Integration - Elementary Integration – Integration of standard functions- Methods of Integration-Integration by substitution- Integration by parts.

UNIT – II (6 Hours)
VECTOR DIFFERENTIATION
Scalar and Vector point functions -Vector Differentiation-Level Surfaces- Gradient of a scalar point function- Normal to a level surface - Directional Derivative – Divergence and Curl of a Vector field - Conservative vector field.

UNIT – III (6 Hours)
VECTOR INTEGRATION
Line, Surface and Volume integrals- Green's Theorem – Gauss Divergence theorem - Stokes's Theorem. (all theorems without proof).

UNIT- IV(8 Hours)
MATRIX THEORY
Rank of matrix- Echelon form - -System of Linear Equations- Consistency of Homogeneous and Non-homogeneous system of equations- Eigen values and Eigen Vectors.

Suggested Books:
1. B.S. Grewal, Higher Engineering Mathematics
2. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

ENGLISH LANGUAGE COMMUNICATION SKILLS
SYLLABUS FOR BRIDGE COURSE B.E. IV-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:50	Course Code: UB21HS410EH
Credits : - - -	CIE Marks: - - -	Duration of SEE: 2 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The Course will enable the Learners to:	At the end of the course the students will be able to :
1. Converse effectively in various context.	1. Use language in appropriate contexts
2. Converse effectively in various context.	2. Listen for global comprehension and infer meaning from spoken discourses.
3. Understand the elements of a good paragraph	3. Write paragraphs coherently.
4. Speak appropriately in daily conversations	4. Use phrases, essential vocabulary and polite expressions in every day conversations.

Unit 1
1.0 Communication & Functional English
1.1 Role and importance of Communication, Process of Communication, Non- verbal communication, barriers to Communication, overcoming barriers. Conversational phrases: greetings, introductions, apology, compliments, agreeing and disagreeing, polite forms in everyday conversations.

Unit 2
2.0 Listening
2.1 Importance of listening, Active listening

Unit 3
3.0: Writing
3.1 Paragraph writing, coherence and cohesion.

Unit 4
4.0 Grammar and Vocabulary
4.1 Common Errors, one word substitutes, collocations.

Unit-5

5.0   Reading

5.1   Prose text- Our Own Civilization–cEM Joad.

Prescribed textbook for theory:

Technical communication - Principles and Practice (2nd Edition 2014)- Meenakshi Raman and

Sangeeta Sharma- Oxford University Press.

Suggested Reading

1.   E.Suresh kumar, P. Sreehari and J. Savithri - Essential English
2.   Reading comprehension - Nuttai.J.C - Orient Blackswan
3.   Sunitha Mishra, C. Murali Krishna, Communication Skills for Engineers, Pearson, 2004. M. Ashraf Rizvi. Effective Technical Communication. Tata Mcgraw Hill, 2005.
4.   Allen and Waters., How English Works
5.   Willis Jane., English through English.

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IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
SYLLABUS FOR BRIDGE COURSE B.E. IV-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:50	Course Code: UB21HS411EH
Credits : - - -	CIE Marks: - - -	Duration of SEE: 2 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The Course will enable the Learners to:	At the end of the course the students will be able to **:**
1. Converse in various situations. 2. Make paper and power point presentations. 3. Speak effectively using discourse markers.	1. Participate effectively in group discussions, public speaking, debates (formal and informal) 2. Research and sift information to make presentations. 3. Listen for gist and make inferences from various speeches. 4. Use connectives and make transitions effectively while speaking.

ELCS- Component – INTERACTIVE COMMUNICATION SKILLS LAB

Group discussion: Objectives of GD, Types of GDs; Initiating, Continuing, and concluding a GD**.**

Debate: Understanding the differences between a debate and a group discussion, essentials of debate, concluding a debate.

Role Plays: Types of Role plays (formal and informal), use of discourse markers.

Presentation Skills: Making effective presentations, researching on various topics, use of Audio visual aids, coping with nerves.

Prescribed textbook for laboratory:
Speak Well: Jayshree Mohanraj, Kandula Nirupa Rani and Indira Babbellapati -Orient Black Swan Longman Dictionary of Contemporary English 6TH edition, 2020

Learning Resources:

1. Balasubramanian: A textbook of English phonetics for Indian students, Macmillan, 2008.
2. Priyadarshini Patnaik **:** Group discussion and interviews, Cambridge University Press India private limited 2011.
3. Daniel Jones: Cambridge English Pronouncing Dictionary - A Definitive guide to contemporary English pronunciation.