

UHV-I: Student's Induction Program (SIP):

The objective is to provide newly admitted students i) a broad understanding of society, relationships and values. ii) Knowledge & skill of his/her study, iii) to nurture character as an essential quality by which he/she shall understand and fulfill the responsibility as an engineer.

Activities : Creative Arts, Universal Human Values, Literary, Proficiency Modules, Physical Activity, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc.

AICTE Activity Points (AAP): (For details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines)

To be earned by all students admitted to BE program over and above the academic grades. A regular student admitted to 4 years Degree program and also through lateral entry shall earn 100 and 75 Activity Points respectively for the award of degree. Students transferred from other Universities to the V semester are required to earn 50 Activity Points from the year of entry. The Activity Points earned shall be reflected in the student's VIII semester Grade Card. The activities can be spread over the course duration, any time during the semester weekends and holidays, as per the convenience of a student from the year of entry to the program. However, the minimum duration (number of hours) should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and is not considered for vertical progression. In case students fail to earn the prescribed AAP, the VIII Semester Grade Card shall be issued only after earning the required points. A student shall be eligible for the award of the degree only after the release of the VIII semester Grade Card.

(ESC - I) Engineering Science Courses - I					(ETC - I) Emerging Technology Courses - I				
Code	Title	L	T	P	Code	Title	L	T	P
22UME122N	Introduction to Mechanical Engineering	3	0	0	22UEC134B	Introduction to Embedded Systems	3	0	0
22UEE116N	Introduction to Electrical Engineering	3	0	0	22UEC135B	Introduction to Communication Technology	3	0	0
22UEC114N	Introduction to Electronics Engineering	3	0	0	22UEE136B	Renewable Energy Sources	3	0	0
22UCS120N	Introduction to 'C' Programming	2	0	2	22UCV138B	Green Buildings	3	0	0
					22UCV139B	Waste Management	3	0	0
					22UCS140B	Introduction to Internet of Things (IOT)	3	0	0
					22UCS141B	Introduction to Cyber Security	3	0	0
					22UME142B	Composite Materials	3	0	0
					22UME143B	Introduction to Robotics	3	0	0
					22UBT148B	Biomass and Bio-energy	3	0	0

(PLC - I) Programming Language Courses - I					NOTE: The student has to, i) Select one course from ESC - I group ii) Select one course from either ETC - I or PLC - I group iii) Opt for the courses from ESC-I group without repeating the course either in 1 st or 2 nd semester If the student studies a subject from ETC - I in 1st semester, then he/she has to select the course from PLC - I in the 2nd semester and vice-versa
Code	Title	L	T	P	
22UCS130B	Introduction to Web Programming	2	0	2	
22UCS131B	Introduction to Python Programming	2	0	2	
22UCS132B	Basics to JAVA programming	2	0	2	
22UCS133B	Introduction to C++ Programming	2	0	2	

Basaveshwar Engineering College, Bagalkote
B.E II - Semester Scheme of Teaching and Examinations
(Academic year 2023-24)

II - Semester (Civil Engineering Stream) Branch: CV (Chemistry Group)

Sl. No.	Course			TD	Teaching (Hours/Week)		Examination				Credits
	Category	Code	Title		Theory Lecture	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	P					
1.	BSC (IC)	22UMA202C	Mathematics for Civil Science - II	Mathematics	3	2	3	50	50	100	4
2.	BSC (IC)	22UCH210C	Chemistry for Civil Sciences	Chemistry	3	2	3	50	50	100	4
3.	ESC	22UME223C	CAED	Civil / Mechanical / IP	2	2	3	50	50	100	3
4.	ESC - I	22UXXXXXN	Engineering Science Course-I	Respective Engg. Dept	3	0	3	50	50	100	3
					2	2					
5.	PLC - I	22UCSXXXB	Programming Language Course-I	Any Engg. Dept	2	2	3	50	50	100	3
	OR										
	ETC - I	22UXXXXXB	Emerging Technology Course - I	Any Engg. Dept.	3	0	3	50	50	100	3
6.	HSSC	22UHS224C	Professional Writing Skills in English	Humanities	1	0	1	50	50	100	1
7.	HSSC	22UHS226C	Samskruthika Kannada*	Humanities	1	0	1	50	50	100	1
		22UHS227C	Balake Kannada**								
8.	AEC	22UHS229C	Innovation and Design Thinking	Any Dept	1	0	1	50	50	100	1
Total					16/16	8/8		400	400	800	20
SDA : Skill Development Activities TD : Teaching Department BSC : Basic Science Course ESC : Engineering Science Courses ETC : Emerging Technology Course AEC : Ability Enhancement Course HSSC : Humanities & Social Science Course SDC : Skill Development Course IC : Integrated Course (Theory & Lab integrated) CIE : Continuous Internal Evaluation SEE : Semester End Examination PLC : Programming Language Course											

*The student who has studied Kannada language as one of the subjects either in 10th, 12th std. or PUC - II has to register

** The student who has not studied Kannada language as one of the subjects either in 10th, 12th std. or PUC - II has to register

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Activities : Creative Arts, Universal Human Values, Literary, Proficiency Modules, Physical Activity, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc.

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(ESC - I) Engineering Science Courses - I					(ETC - I) Emerging Technology Courses - I				
Code	Title	L	T	P	Code	Title	L	T	P
22UME222N	Introduction to Mechanical Engineering	3	0	0	22UEC234B	Introduction to Embedded Systems	3	0	0
22UEE216N	Introduction to Electrical Engineering	3	0	0	22UEC235B	Introduction to Communication Technology	3	0	0
22UEC214N	Introduction to Electronics Engineering	3	0	0	22UEE236B	Renewable Energy Sources	3	0	0
22UCS220N	Introduction to 'C' Programming	2	0	2	22UCV238B	Green Buildings	3	0	0
					22UCV239B	Waste Management	3	0	0
					22UCS240B	Introduction to Internet of Things (IOT)	3	0	0
					22UCS241B	Introduction to Cyber Security	3	0	0
					22UME242B	Composite Materials	3	0	0
					22UME243B	Introduction to Robotics	3	0	0
					22UBT248B	Biomass and Bio-energy	3	0	0
(PLC - I) Programming Language Courses - I					NOTE: The student has to, i) Select one course from ESC - I group ii) Select one course from either ETC - I or PLC - I group iii) Opt for the courses from ESC-I group without repeating the course either in 1 st or 2 nd semester If the student studies a subject from ETC - I in 1st semester, then he/she has to select the course from PLC - I in the 2nd semester and vice-versa				
Code	Title	L	T	P					
22UCS230B	Introduction to Web Programming	2	0	2					
22UCS231B	Introduction to Python Programming	2	0	2					
22UCS232B	Basics to JAVA programming	2	0	2					
22UCS233B	Introduction to C++ Programming	2	0	2					

Code: 22UMA102C	MATHEMATICS FOR CIVIL SCIENCES-I (INTEGRATED)	CREDITS:04
L:T:P: 3:0:2		CIE Marks : 50
Total Hours : 60 (40L+20 P)		SEE Marks : 50
Course Objectives: <ol style="list-style-type: none"> 1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills. 2. State the need for Mathematics with Engineering Studies and Provide real-life examples. 3. Support and guide the students for self-study. 4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress. 5. Encourage the students to group learning to improve their creative and analytical skills. 		
UNIT-I		10 Hrs.
Calculus Introduction to polar coordinates and curvature relating to Civil engineering. Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature (No proof) - Cartesian, Parametric, Polar and Pedal forms. Problems. Self-study: Center and circle of curvature, evolutes and involutes. Applications: Structural design and paths, Strength of materials, Elasticity.		
UNIT-II		10 Hrs.
Series Expansion and Multivariable Calculus Introduction to series expansion and partial differentiation in the field of Civil engineering applications. Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule ($0/0, \infty/\infty, \infty-\infty$), problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables - Problems. Self-study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint. Applications: Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.		
UNIT-III		10 Hrs.
Ordinary Differential Equations (ODEs) of first and Higher order Introduction to first and higher-order ordinary differential equations pertaining to the applications for Civil engineering. Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $1/N (\partial M/\partial y - \partial N/\partial x)$ and $1/M (\partial N/\partial x - \partial M/\partial y)$. Orthogonal trajectories and Newton's law of cooling. Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations - Problems. Self-Study: Applications of ODEs in Civil Engineering problems like bending of the beam, whirling of shaft. Formulation and solution of Cantilever beam. Finding the solution by the method of Undetermined coefficients. Applications: Rate of Growth or Decay, Conduction of heat. Oscillations of a spring, Transmission lines, Highway engineering.		

Linear Algebra**Introduction of linear algebra related to Civil Engineering applications.**

Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

Self-Study: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.

Applications: Structural Analysis, Balancing equations.

List of Experiments:

- 1 2D Plots for Cartesian curves
 - i. Plot of parabola $y = x^2$, and $y = \sin x$, $y = \tan x$
 - ii. Plot of Perfect parabola $y = x^2$
 - iii. Change the color (Green) of perfect color perfect parabola
 - iv. Change the color (Red) of perfect color perfect parabola
 - v. Draw a red color with ' - - ' perfect parabola
 - vi. Draw a red color with ' * ' perfect parabola
 - vii. Draw a red color with axes label perfect parabola
 - viii. Draw a perfect parabola with animation
 - ix. Draw parametric curves cycloid
 - a. $x = a(t + \sin t)$, $y = a(1 + \cos t)$
 - b. $x = a(t - \sin t)$; $y = a(1 - \cos t)$
 - c. $x = a(t - \sin t)$; $y = a(1 + \cos t)$
 - d. $x = a(t + \sin t)$, $y = a(1 - \cos t)$
 - e. $x = t^2$, $y = t - (t^3/3)$
- 2 Plotting of polar
 - i) Cardioid $r = a + b \cos \theta$
 - ii) Cardioid $r = a + b \cos \theta$, if $a > b$
 - iii) Cardioid $r = a + b \cos \theta$, if $b > a$
 - iv) Draw polar petals $r = 2 \cos 4\theta$
 - v) $R = 2 \cos \theta$, $r = 2 \cos 7\theta$, $r = 2 \cos 6\theta$, $r = 2 \cos 5\theta$
 - vi) Cardoid $r = a(1 + \cos \theta)$
 - vii) Cardoid $r = a(1 - \cos \theta)$
 - viii) Draw histogram curves
- 3
 - i) Plot 3-d Surface $z = x^2 + y^2$
 - ii) Plot 3-d color Surface $z = x^2 + y^2$
 - iii) Plot 3-d Surface $z = x^4 + y^4$
 - iv) Plot 3-d Surface $z = \sin t \cos t$
- 4
 - i) To calculate volume of a sphere
 - ii) To Evaluate $\int_0^5 x dx$ and $\int_0^5 \sin x dx$
- 5
 - i) Solve first order o.d.e. $\frac{dy}{dx} = e^{-x}$, $x = 0$, $y = 0$
 - ii) Solve first order o.d.e. $\frac{dy}{dx} + e^{-x}y = x^2$, $x = 0$, $y = 0$

Note: Change the initial conditions and observe the graph
- 6
 - i) Solve $2y'' - 5y' + y = 0$, $y(3) = 6$, $y'(3) = 1$.
 - ii) Solve $y'' + 3y' - 10y = 0$, $y(0) = 1$, $y'(0) = 3$
- 7
 - i) Define polynomial and to solve polynomials.

22UPH106C/22UPH206C	PHYSICS FOR CIVIL SCIENCES (INTEGRATED)	CREDITS: 04
L:T:P: 3:0:2		CIE MARKS:50
Total Hours: 60 Hrs (40L+20 P)		SEE MARKS:50
Course Objectives: <ol style="list-style-type: none"> 1. To study the properties, generation and engineering applications of types of oscillations and shock waves 2. To study the basics of Laser and optical fiber and their engineering applications 3. To identify the importance of acoustics, radiometry and photometry for engineering applications 4. To study the elastic properties of materials and failures of engineering materials 5. To understand the various natural disaster and safety 		
UNIT-I		10 Hrs.
<p>Oscillations: Simple Harmonic motion (SHM), the differential equation for SHM (no derivation), Springs: Stiffness factor and its physical significance, series and parallel combination of springs (derivation), Types of spring and their applications. Theory of damped oscillations (Qualitative), Types of damping (Graphical approach). Engineering applications of damped oscillations, Theory of forced oscillations (Qualitative), resonance, sharpness of resonance. Numerical problems.</p> <p>Laser: Introduction, absorption, spontaneous emission and stimulated emission, Einstein's coefficients (expression for energy density). Conditions for laser action, requisites of a laser system, working mechanism. Characteristics of a laser. Classification of lasers, Semiconductor laser, Laser range finder, LIDAR, Road profiling, Bridge deflection, Speed checker. Numerical Problems.</p> <p>Pre-requisites: Basics of oscillations, properties of light</p> <p>Self-learning: Simple harmonic motion, differential equation for SHM</p>		
UNIT-II		10 Hrs.
<p>Optical fibers: Principle and construction of optical fibers, Acceptance angle and numerical aperture (NA), Expression for NA, Modes of propagation, Attenuation and Fiber losses, Fiber optic displacement sensor, Fiber optic temperature sensor, Numerical problems.</p> <p>Acoustics: Introduction to acoustics, Types of acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its measurements, Sound insulation and its measurements. Impact of noise in Multi-storied buildings. Numerical problems.</p> <p>Pre-requisites: Basics of Sound,</p> <p>Self-learning: Introduction to acoustics, Propagation mechanism and TIR in optical fiber</p>		
UNIT-III		10 Hrs.
<p>Elasticity: Stress-Strain Curve, Stress hardening and softening. Elastic moduli, Poisson's ratio, Relation between Y, n and σ (with derivation), mention relation between K, Y and σ, limiting values of Poisson's ratio., Single cantilever (derivation) and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems.</p> <p>Radiometry and Photometry: Radiation quantities, Spectral quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).</p> <p>Pre-requisites: Elasticity, Stress and</p>		

strainSelf-learning: Stress-Strain curve**UNIT-IV****10 Hrs.**

Shock waves: Mach number and Mach Angle, Mach Regimes, definition and characteristics of shock waves, Construction and working of Reddy shock tube, Applications of shock Waves, Numerical problems.

Natural hazards and Safety: Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rainfall, geological structure, human excavation etc, types of landslide, adverse effects, engineering solution for landslides). Forest Fires and detection using remote sensing. Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

Pre-requisite: Oscillations Self-learning: Richter scale

LIST OF EXPERIMENTS:**Any Ten experiments have to be completed from the list of experiments**

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1. The study of forced mechanical oscillations and resonance
2. Determination of effective string constant of the given springs in series and parallel combinations
3. The study of characteristics of a laser
4. Determination of Young's modulus of metal strip by single cantilever method
5. Determination of rigidity modulus of a wire by torsional pendulum method
6. Determination of Young's modulus of a given metal strip by uniform bending method
7. Determination of specific heat of a solid by using calorimeter
8. Determination of viscosity of a given liquid by Stoke's method
9. The study of frequency response in series and parallel LCR circuits
10. Identification of passive components and estimation of their values in a given black box
11. Determination of velocity of ultrasonic waves in a given liquid using ultrasonic interferometer
12. Determination of dielectric constant of a material in a capacitor by charging and discharging method
13. Determination of Fermi energy for a conductor
14. Determination of energy gap of a semiconductor by four probe method
15. Determination of acceptance angle and numerical aperture of a given optical fiber
16. Determination of the radius of curvature of a given planoconvex lens by Newton rings method
17. Step Interactive physical simulations
18. Study of motion using spread sheets
19. Study of application of statistics using spread sheets
20. PHET Interactive simulations

(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>)

Reference Books:

1. R. Balasubramaniam, 2020, "Materials Science and Engineering", 9th edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi
2. M. N. Avadhanulu, P. G. Kshirsagar and T. V. S. Arun Murthy, 2019, "A Textbook of Engineering Physics" 11th edition, S Chand and Company Ltd. New Delhi-110055.
3. R. K. Gaur and S. L. Gupta, 2010, "Engineering Physics", 8th edition, Dhanpat Rai publications Ltd., New Delhi
4. B. B. Laud, 2002, "Lasers and Non-Linear Optics", 2nd edition, New Age International
5. K.R. Nambiar, 2006, "Lasers Principles, Types and Applications", New Age International Publishers
6. Tor Eric Vigran, Taylor and Francis, 2019, "Building Acoustics", 1st Edition CRC Press
7. Micheal Bukshtab, 2012 "Photometry Radiometry and Measurements of Optical Losses", 2nd edition Springer
8. Chintoo S Kumar, K Takayama and K. P. J Reddy, 2014, "Shock waves made simple", Willey India Pvt. Ltd, Delhi
9. Edward Bryant, 2001 "Natural Hazards", 2nd Edition. Cambridge University Press
10. Ramesh P. Singh and Darius Bartlett, 2018, "Natural hazards, Earthquakes, Volcanoes, and landslides", 1st edition, CRC Press, Taylor and Francis group

Web links and Video Lectures (e-Resources):**Web links:**

Simple Harmonic motion: <https://www.youtube.com/watch?v=k2FvSzWeVxQ>

Shock waves: <https://physics.info/shock/>

Shock waves and its applications: https://www.youtube.com/watch?v=tz_3M3v3kxk

Stress-strain curves: <https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>

Stress curves: <https://www.youtube.com/watch?v=f08Y39UiC-o>

Oscillations and waves : [https://openstax.org › books › college-physics-](https://openstax.org/books/college-physics-2e)

2e Earthquakes: www.asc-india.org

Earthquakes and Hazards: <http://quake.usgs.gov/tsunami>

Landslide hazards: <http://landslides.usgs.gov>

Acoustics: <https://www.youtube.com/watch?v=fHBPvMDFyO8>

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

<http://nptel.ac.in>

<https://swayam.gov.in>

https://virtuallabs.merlot.org/vl_physics.html

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

Course outcomes:

At the end of the course the student will be able to

1. Apply concepts of oscillations and select appropriate properties of lasers for engineering applications
2. Select the appropriate type of optical fiber and apply concepts of acoustics for engineering applications
3. Apply the concepts of elasticity, radiometry and photometry for engineering applications
4. Apply concepts of shockwaves, natural hazards and safety precautions for engineering applications

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	1	-	-	-	1	-	-	1
CO2	3	2	-	-	1	-	-	-	1	-	-	1
CO3	3	2	-	-	-	-	-	-	1	-	-	1
CO4	3	2	-	-	1	1	1	-	-	-	-	1

22UCV117C	ENGINEERING MECHANICS	CREDITS:03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS		SEE MARKS:50
Course Objectives: 1. To analyse the problems involving concurrent forces. 2. To analyse moment and support reactions of rigid bodies. 3. To analyse the trusses for member forces. 4. To make students to learn the effect of friction on different planes. 5. To find out the centre of gravity and moment of inertia		
UNIT-I		10 Hrs.
Introduction to Engineering Mechanics: Particle, continuum, rigid body, laws of motion, law of parallelogram of forces, polygon law of forces, classification of force system, resolution and composition of forces, principle of transmissibility of force. Resultant of co-planar concurrent force system. Lami's theorem, equilibrium of a particle, Numerical problems. Forces in Space: Resultant of non-coplanar concurrent forces. Equilibrium of non-coplanar concurrent forces. Numerical Problems.		
UNIT-II		10 Hrs.
Moment and Couple: Definition of moment, moment of a couple, characteristics of a couple, equivalent force and couple system, Varignon's principle, resultant of coplanar non concurrent force system. Numerical problems. Support Reaction: Types of beams, loads and supports. Support reaction of statically determinate beams subjected to various loads. Numerical problems.		
UNIT-III		10 Hrs.
Analysis of Trusses: Introduction, classification of trusses, analysis of plane perfect trusse by the method of joints and method of sections. Numerical examples. Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane & inclined plane and ladder friction. Numerical examples.		
UNIT-IV		10 Hrs.
Centroid of Plane areas: Introduction, locating the centroid of rectangle, triangle, circle, semicircle and quarter circle using method of integration and centroid of composite sections. Numerical examples. Moment of Inertia of Plane areas: Introduction, moment of inertia, polar moment of inertia, radius of gyration, parallel and perpendicular axis theorem, moment of inertia of rectangle, triangle, circle, semicircle and quarter circle using method of integration. Moment of inertia of composite sections. Numerical examples.		
Reference Books:		
1. Beer F.P. and Johnston E. R., " <i>Mechanics for Engineers</i> " Statics, McGraw Hill Publications, 2011 2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, <i>Basic "Civil Engineering and Engineering Mechanics"</i> , Laxmi Publications, 2015 3. Kolhapure B. K., " <i>Elements of Civil Engineering and Engineering Mechanics</i> ", EBPB, 2014 4. Singer F.L., " <i>Engineering Mechanics statics and dynamics</i> " 3 rd Edition, Horper and International New York, 1975 5. Irving H. Shames, " <i>Engineering Mechanics</i> ", Prentice-Hall, 2019		

22UME122N/22UME222N	INTRODUCTION TO MECHANICAL ENGINEERING	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS		SEE MARKS:50
Course Objectives:		
1. Acquire a basic understanding about scope of mechanical engineering, different energy sources. 2. Acquire a basic knowledge about conventional and advanced manufacturing processes. 3. Acquire a basic understanding about IC engines. 4. Acquire a basic knowledge about joining processes and CNC machines. 5. Acquire a basic insight into future mobility, mechatronics, robotics and IoT.		
UNIT-I		10Hrs.
Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys.		
UNIT-II		10Hrs.
Machine Tool Operations: Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working of Milling Machine, Milling operations: plane milling and slot milling. (No sketches of machine tools, sketches to be used only for explaining the operations). Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing. Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.		
UNIT-III		10 Hrs.
Introduction to IC Engines: Components and Working Principles, 4-Stroke Petrol and Diesel Engines, Application of IC Engines. Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.		
UNIT-IV		10Hrs.
Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages. Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages Introduction to IOT: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.		
Reference Books:		
1. Hazra Choudhry and Nirzar Roy, "Elements of Workshop Technology" Vol. 1 and 2, Media Promoters and Publishers Pvt. Ltd., 2010. 2. P.N.Rao, "Manufacturing Technology- Foundry, Forming and Welding", Tata McGraw Hill 3 rd Edition 2003. 3. V. Ganesan, "Internal Combustion Engines", Tata McGraw Hill Education; 4 th edition, 2017. 4. Appu Kuttan KK K "Robotics", International Pvt. Ltd, volume 1 5. Dr SRN Reddy, RachitThukral and Manasi Mishra, " Introduction to Internet of Things: A		

Practical Approach”, ETI Labs

7. Raj kamal, “Internet of Things: Architecture and Design”, McGraw hill.
8. K R Gopala Krishna, “Elements of Mechanical Engineering” , Subhash Publications, 2008
9. Jonathan Wickert and Kemper Lewis, “An Introduction to Mechanical Engineering”, 3rd Edition, 2012.

Course Outcomes:

After completion of the course the students will be able to,

- CO1:** Explain the role of Mechanical Engineering with respect to the emerging trends and technologies in various sectors, knowledge of various sources of energy and engineering materials
- CO2:** Describe different conventional, advanced manufacturing systems and various metal joining processes
- CO3:** Compute and analyze the performance of IC engines used in automobiles and concept of electric and hybrid vehicles for future mobility
- CO4:** Enlighten about the fundamentals of Mechatronics, Robotics, Automation in industry and IOT

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	1	1	-	-	-	1
CO2	2	2	-	-	1	1	1	-	-	-	-	1
CO3	2	1	-	-	1	1	-	-	-	-	-	1
CO4	2	1	-	-	1	1	-	1	1	-	-	1

22UEE116N/22UEE216N	INTRODUCTION TO ELECTRICAL ENGINEERING	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. To understand the working of Hydro –electric, Thermal and Nuclear power plants 2. To determine current, voltage, and power in various branches by applying electric circuit theorems to DC and AC (single phase and three phase) circuits 3. To analyze the working principle and construction to identify the suitable applications of DC generators, motors and transformers by identifying the specifications 4. To identify the safety aspects in different types of wiring mechanisms and evaluate the energy consumption in domestic loads 		
UNIT – I		10 Hrs
<p>Introduction: General structure of electrical power systems using single line diagram approach.</p> <p>Power Generation: Hydel, thermal, nuclear power plants (block diagram approach).</p> <p>DC Circuits: Ohm’s law and its limitations, KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.</p>		
UNIT – II		10 Hrs
<p>AC. Fundamentals: Equation of AC voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor (only definitions), voltage and current relationship with phasor diagrams in R, L, and C circuits, concept of impedance, analysis of R-L, R-C, R-L-C series circuits, active power, reactive power and apparent power, concept of power factor. (Simple Numerical).</p> <p>Three Phase Circuits: Generation of three phase AC quantity, advantages and limitations, star and delta connection, relationship between line and phase quantities (excluding proof)</p>		
UNIT – III		10 Hrs
<p>DC Generator, DC Motor, Transformers: Working principle, construction, equations, types and classifications, specifications, applications, cost. Simple numerical.</p>		
UNIT – IV		10 Hrs
<p>Domestic Wiring: Requirements, Types of wiring, Two way and three way control of loads.</p> <p>Electrical Energy Calculation: Power rating of household appliances, two-part electricity tariff, calculation of electricity bill for domestic consumers.</p> <p>Electrical Safety Measures: Equipment: Types of equipment, voltage and current issues, safety. Human: Electric shock, effect of shock on body, factors affecting severity of shock, safety precautions.</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. B.L Theraja, “Fundamentals of Electrical Engineering and Electronics”, S. Chand Publications, 27th Edition, 2014. 2. D C Kulshreshtha, “Basic Electrical Engineering”, Tata McGraw Hill, 10th Edition, 2019. 3. Edward Hughes, “Electrical and Electronic Technology”, Pearson Publications, 10th Edition, 2010. 4. Rajendra Prasad, “Fundamentals of Electrical Engineering”, PHI Learning, 2nd Edition, 2009. 5. V.N.Mittle and A.Mittal, “Basic Electrical Engineering”, Tata McGraw-Hill Education, 2005. 		

Course Outcomes:

After completion of the course the students will be able to,

CO1: Understand the working of Hydro –electric, Thermal and Nuclear power plants

CO2: Apply the electric circuit theorems to DC and AC (single phase and three phase) circuits to determine current, voltage, and power in various branches

CO3: Analyze the working principle and construction to identify the suitable applications of DC generators, motors and transformers by identifying the specifications

CO4: Identify the safety aspects in different types of wiring mechanisms and evaluate the energy consumption in domestic loads

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	-	-	-	-	-	-	-	-	-	-	1
CO2	3	1	1	1	-	-	-	-	-	-	-	1
CO3	3	1	1	1	-	-	-	-	-	-	-	1
CO4	3	1	1	1	-	-	-	1	-	1	-	1

22UEC114N/22UEC214N	INTRODUCTION TO ELECTRONICS ENGINEERING	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS		SEE MARKS:50
Course Objectives		
<ol style="list-style-type: none"> 1. Understand the operation of semiconductor devices and their applications. 2. Know transistor (BJT) as an amplifier. 3. Study Op-Amps and its applications. 4. Know logic circuits and their optimization. 5. Understand the principles of transducers and communication systems. 		
UNIT - I		10 Hrs
<p>Power Supplies –Block diagram, PN Junction Diode Characteristics, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.</p> <p>BJT Characteristics and Biasing- Common Base and Common Emitter Configurations, Voltage Divider Biasing.</p> <p>Self study component: Switched Mode Power Supply.</p>		
UNIT – II		10 Hrs
<p>Amplifier and Oscillators – Single Stage CE Amplifier, Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multi vibrators, Single-stage a stable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations)</p> <p>Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op-amp circuits: Inverting and non-inverting amplifiers, voltage follower, summer, integrator, differentiator.</p> <p>Self study component: Op-Amp as zero crossing detector</p>		
UNIT - III		10 Hrs
<p>Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates</p> <p>Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder, Parallel Adder</p> <p>Self study component: Half subtractor and full subtractor.</p>		
UNIT - IV		10 Hrs
<p>Analog Communication Schemes – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, FM.</p> <p>Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques.</p> <p>Sensors and Interfacing – Instrumentation and control systems, Transducers, Sensors.</p> <p>Self study component: Opto-couplers</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. Mike Tooley, “Electronic Circuits, Fundamentals & Applications”, 4th Edition, Elsevier, 2015. 2. M. Morris Mano, “Digital Logic and Computer Design”, PHI Learning, 2008. 3. D.P.Kothari, I. J. Nagrath, “Basic Electronics”, 2nd edition, McGraw Hill Education (India), Private Limited, 2018. 		

Course Outcomes:

After completion of the course the students will be able to,

CO1: Differentiate semiconductor devices and their parameters based on V-I characteristics.

CO2: Analyze the applications of electronic devices and circuits.

CO3: Analyze logic circuits built with basic gates.

CO4: Solve numerical problems related to basic electronic circuits and systems.

CO5: Decide type of transducer, sensor and modulation for a given application.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2	-	2	2	-	-	-	-	-	-
CO2	3	2	3	-	2	1	-	-	-	-	-	-
CO3	3	2	3	-	3	-	-	-	1	-	-	-
CO4	2	1	1	-	2	1	-	-	1	-	-	1
CO5	2	1	1	-	2	1	-	-	1	-	-	1

22UCS120N/ 22UCS220N	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS:50
TOTAL HOURS: 46HRS (26T+20 P)		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Explain the basic architecture and functionalities of a Computer 2. Apply programming constructs of C language to solve the real-world problems 3. Explore user-defined data structures like arrays and structures in implementing solutions to problems 4. Design and Develop Solutions to problems using structured programming constructs such as functions and procedures 		
UNIT – I		07 Hrs.
<p>Basic Organization of a Computer, Steps in problem solving, Algorithms and Flowcharts with examples. Overview of C: Features of C, Structure of C program, process of compiling and executing the C program.</p> <p>Constants, Variables and Data types: Introduction, Character set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables, Example programs.</p> <p>Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and Decrement operators, Conditional operator, Bitwise operators, Special operators, Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversion in expressions, Operator precedence and Associativity.</p>		
UNIT – II		06 Hrs
<p>Managing Input and Output Operations: Formatted and Unformatted input and output statements.</p> <p>Decision making and Branching: Decision making with <i>if</i>, <i>if-else</i>, Nesting of <i>if-else</i> statements, <i>else-if</i> ladders, <i>switch</i> statement: Operator, <i>go to</i> statement.</p> <p>Decision making and Looping: <i>while</i> statement, <i>do-while</i> statement, <i>for</i> statement, jumps in loops.</p>		
UNIT – III		06 Hrs
<p>Arrays: Introduction, One dimensional arrays, declaration and initialization of one-dimensional arrays, Two dimensional arrays, declaration and initialization of two-dimensional arrays. Operations on arrays.</p> <p>Strings: Introduction, Declaring and initializing string variables, String-handling functions, Array of String.</p>		
UNIT – IV		07 Hrs
<p>User defined functions: Introduction, Need for user-defined functions, a multi-function program, Elements of user defined function, Definition of functions, Return values and their types, Function calls, Function declaration. Category of functions: Based on call by value, call by reference, argument and return type and recursion.</p> <p>Structures: Defining a structure, Declaring structure variables, Accessing structure members, Initialization, Arrays of structure, Structures and Functions.</p>		

Programming Exercises:

Part – A

1. Write a C program that aid in evaluating return on investment of Principal amount for 3 years at 9% rate of interest using simple interest and compound interest. $SI = PTR/100$ and $CI = P[1+R/100]^t - P$.
2. C Program to find Mechanical Energy of a particle using $E = mgh + 1/2 mv^2$.
3. C Program to convert Kilometers into Meters and Centimeters.
4. Write a C Program to detect whether the nature of solutions is acidic/neutral/base by reading value of pH.
5. Write a C program to determine whether a seller has made the profit or incurred the loss and display the amount and percentage of profit or loss.
6. Write a C program to identify whether the entered character belongs to an alphabet, digit or special character.
7. Write a C program to input marks of five subjects Physics, Chemistry, Biology, Mathematics and Computer. Calculate percentage and display the grade according to following:

Percentage Grade

More than or equal to 90% S Between 80% - 89.99% A

Between 70%-79.99% B

Between 60%-69.99% C

Between 40%-59.99% D

Between 35%-40% E

Below 35% F

8. Write a C program, to check whether a person is eligible for the marriage or not.
9. Write a C program to identify the quadrant of a point, when coordinates (x,y) are given.
10. Write a C program to compute area of the following of geometric objects based on user's preference using switch case:
 - i. Circle
 - ii. Triangle
 - iii. Parallelogram
 - iv. Square

Part - B

11. Write a C program to generate multiplication table between 1 to n.
12. Write a C program to generate the prime numbers between 1 to n.
13. Write a C program to Implement Linear Search on Integers.
14. Write a C program to perform addition of 2 Matrix.
15. Sort the given set of N numbers using selection sort.
16. Write functions to implement string operations such as compare, concatenate, and find stringlength. Use the parameter passing techniques.
17. Write a C program to find the value of a^n using user-defined function.
18. Write a C program to find the factorial of a number using recursive function.
19. Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
20. Write a C program to read two numbers and swap them with help of function through call by reference method.

22UEC134B/22UEC234B	INTRODUCTION TO EMBEDDED SYSTEM	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To provide knowledge of embedded systems, applications, purpose and processor architectures. 2. To provide background knowledge of communication interfaces, characteristics and quality attributes of embedded systems. 3. To study general purpose processors software and processor peripherals. 4. To impart knowledge of 8051 Microcontroller, features and its applications. 		
UNIT – I		10 Hrs
Introduction to embedded systems, Embedded system vs. general computing system, Classifications, Purpose of embedded system, Major application areas. The typical embedded system, Microcontrollers, Microprocessors, RISC, CISC, Harvard and Von-Neumann, Big Endian, Little Endian processors.		
UNIT – II		10 Hrs
Memory, Sensors, Actuators, Communication interface: Inter Integrated Interface, Serial Peripheral interface, UART, Parallel interface, RS232 and Bluetooth. Characteristics and quality attributes of embedded systems.		
UNIT - III		10 Hrs
General purpose processors software: Introduction, Basic architecture, Operation, Instruction set, program and data memory space, registers, I/O, interrupts, Operating System, ASIP's, Microcontrollers, DSP, Selecting Microprocessor. Standard Single Purpose Processors peripherals: Introduction, Timers, Counters and watch dog timers, UART.		
UNIT - IV		10 Hrs
8051 Microcontroller: Introduction, Features of 8051 Microcontroller, Block diagram, ALU, PC, ROM, RAM, Address line, Data line, Special function registers, RAM organization, Stack, Basics of Serial Communication, Interrupts, Timers and counters, Input output ports, simple pseudo code.		
Reference Books:		
<ol style="list-style-type: none"> 1. Shibu K V, "Introduction to embedded systems", Tata McGraw Hill private limited, 2010. 2. Frank Vahid, Tony Givargis, "Embedded system design: A unified hardware/software introduction", John Wiley and Sons, 2001. 3. Kenneth J Ayala, "The 8051 Microcontroller, Architecture programming and applications", West publishing company, college and school division, 1997. 4. Rajkamal, "Embedded systems: architecture, programming and design", Tata McGraw Hill private limited, second edition. 		

Course Outcomes:

After completion of the course the students will be able to,

CO1: Gain comprehensive knowledge about embedded systems, major application area of embedded systems and processor architectures.

CO2: Analyze communication interfaces, characteristics and quality attributes of embedded systems.

CO3: Identify general purpose processors software and processor peripherals necessary for embedded systems.

CO4: Explore 8051 Microcontroller capabilities and able to write pseudo codes.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	-	-	2	1	1	1	1	1	-	1
CO2	3	2	2	-	1	1	1	1	1	2	-	1
CO3	3	2	2	-	1	2	1	1	2	1	-	2
CO4	3	2	2	-	1	2	1	1	2	1	-	2

22UEC135B/22UEC235B	INTRODUCTION TO COMMUNICATION TECHNOLOGY	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Know the fundamentals of different communication systems. 2. Understand modern communication techniques and their utility in modern cellular communication systems. 3. Know the design principles of cellular communication systems. 4. Understand the different communication standards. 		
UNIT – I		10 Hrs
<p>Introduction to communication systems: Elements of communication systems, Need for modulation, Electromagnetic spectrum and applications, Terminologies in communication systems</p> <p>Introduction to wireless .communication systems: Evolution of mobile radio communication, Beginning of Radio, Wireless mobile communication, Applications of wireless communication, Disadvantages of wireless communication systems, Examples of wireless communication systems, Difference between fixed telephone network and wireless telephone network, Development of wireless communication, Fixed network transmission hierarchy, Comparison of wireless communication systems.</p>		
UNIT – II		10 Hrs
<p>Modern communication systems: Introduction, First generation (1G), Second generation (2G), Generation (2.5G), Third generation (3G), Evolution from 2G to 3Gt, Fourth generation (4G), Digital cellular parameters, Differences between analog cellular and digital cellular systems, wireless local loop (WLL), wireless local area networks (WLANs), Personal Area Networks (PANs), Bluetooth</p> <p>Introduction to cellular mobile systems: Introduction, Spectrum allocation, International telecommunication union (ITU), Wireless communication system, Basic components of cellular systems, Cellular system architecture, GSM: Most popular cellular system, type of channels, Cell concept in wireless communication, shape selection of the cell.</p>		
UNIT – III		10 Hrs
<p>Cellular system design fundamentals: Introduction, Frequency reuse, Cellular capacity increasing parameters, channel assignment strategies, Hand-off strategies, Hands-off Initiation, Type of hands-off on the basis of decision making process, channel assignment strategies for hands-off, Interference, Tracking, Trunking, Grade of service.</p>		
UNIT – IV		10 Hrs
<p>Multiple access techniques for wireless communication: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Advanced TDMA, Multipath interference, Comparison between TDMA & FDMA, Space Division Multiple Access (SDMA), Spread spectrum, types of spread spectrum, Code Division Multiple Access (CDMA)</p> <p>Radio wave propagation: Introduction, Doppler shift, parameters of multipath channels, fading, diversity techniques, free space propagation model, Phenomenon of propagation, Propagation Models.</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. George Kennedy, Bernard Davis, S R M Prasanna, “Electronic Communication Systems”, Tata McGraw Hill Education Private Limited, New Delhi, 5th Edition. 2. Rajeshwar Dass, “Wireless Communication Systems”, I. K. international Publishing House Pvt. Ltd., New Delhi. 		

Course Outcomes:

After completion of this course the students are able to,

CO1: Analyze different communication systems with respect to operation and utility.

CO2: Choose suitable modulation technique for cellular mobile systems.

CO3: Decide specific channel multiple access techniques for a communication application.

CO4: Choose specific communication standards for a given communication application.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	1	1	1	1	1	1	-	1
CO2	3	2	2	-	1	1	1	1	1	2	-	1
CO3	3	2	2	-	1	2	1	1	2	1	-	2
CO4	3	2	2	-	1	2	1	1	2	1	-	2

22UEE136B/22UEE236B	RENEWABLE ENERGY SOURCES	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. To identify the parameters required for solar, wind, biomass, geothermal and ocean energy conversion systems. 2. To apply and analyze concepts and theory related to solar, wind, biomass, geothermal and ocean energy conversion systems. 3. To derive power output of solar and wind energy conversion systems based on the corresponding solar irradiation and wind speed respectively. 4. To analyze pros and cons of solar, wind, biomass, geothermal and ocean energy conversion systems. 		
UNIT – I		10 Hrs
Introduction to Energy Sources:		
Classification of energy resources, conventional energy resources–availability and their limitations; non-conventional energy resources–classification, advantages, limitations; comparison of conventional and non-conventional energy resources.		
Solar Energy Basics:		
Introduction, solar constant, basic sun-earth angles – definitions and their representation; solar radiation geometry, solar radiation data measuring instruments–Pyranometer and Pyrhelimeter.		
UNIT – II		10 Hrs
Solar Thermal Systems:		
Principle of conversion of solar radiation into heat, solar water heaters (Flat plate collectors); solar cookers – box type, concentrating dish type; solar driers, solar still.		
Solar Electric Systems:		
Solar thermal electric power generation – solar pond and concentrating solar collector (parabolic trough, parabolic dish, central tower collector), advantages and disadvantages; solar photovoltaic – solar cell fundamentals, module, panel and array; solar PV systems – street lighting, domestic lighting and solar water pumping systems.		
UNIT – III		10 Hrs
Wind Energy:		
Wind and its properties, history of wind energy, basic principles of Wind Energy Conversion Systems (WECS), wind data measuring instrument, classification of WECS, parts of a WECS, power in the wind; Vertical axis wind turbine generator - Savinuous and Darrius types, advantages and limitations of WECS.		
Biomass Energy:		
Introduction, photosynthesis process, biomass conversion technologies, biomass gasification – principle and working of gasifiers; biogas - production of biogas, factors affecting biogas generation; types of biogas plants–KVIC and Janata model.		
UNIT – IV		10 Hrs
Geothermal Energy:		
Introduction, classification, conversion technologies, applications, advantages and limitations of geothermal resources.		
Energy from Ocean:		
Principle of tidal power, components of Tidal Power Plant (TPP), classification, advantages and limitations of TPP.		
Ocean Thermal Energy Conversion (OTEC): Principle of OTEC system, types of OTEC power generation, block diagram, applications, advantages and limitations.		

Reference Books:

1. B. H. Khan, "Conventional Energy Resources", Tata McGraw-Hill Education Private Limited, New Delhi, 3rd Edition, 2007.
2. G. D. Rai, "Non-conventional Energy sources", Khanna Publication, 4th Edition, 2015.
3. G. N. Tiwari and M K. Ghosal, "Fundamentals of Renewable Energy Resources", Alpha Science International Ltd, 1st Edition, 2007.
4. Shobh Nath Singh, "Non-Conventional Energy Resources", Pearson Education, 2nd Edition 2018.
5. Bent Sorensen, "Renewable Energy", Academic Press, 5th Edition, 2017 (e-book).
6. David Buchla, Thomas Kissell and Thomas Floyd, "Renewable Energy Systems", Pearson, 1st Edition, 2014 (e-book).
7. Roland Wengenmayr, Thomas Buhrke, "Renewable Energy: Sustainable Energy Concepts for the Future", Wiley-VCH, 2nd Edition, 2008 (e-book).

Course Outcomes:

After completion of the course the students will be able to,

CO1: Identify electrical and mechanical devices of solar, wind, biomass, geothermal and ocean Energy conversion systems.

CO2: Measure performance parameters related to solar, wind, biomass, geothermal and ocean energy conversion systems.

CO3: Compute the power generation of wind and solar energy correspond to variable data.

CO4: Compare the features of solar, wind, biomass, geothermal and ocean energy conversion systems.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	-	1	1	1	-	1	1	1
CO2	3	1	1	1	-	1	1	1	-	1	-	1
CO3	3	2	3	1	-	-	-	-	-	-	1	1
CO4	3	3	3	2	-	-	-	1	-	-	-	1

22UCV138B/22UCV238B	GREEN BUILDINGS	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS		SEE MARKS:50
Course Objectives: <ol style="list-style-type: none"> 1. Understand the Definition, Concept & Objectives of the terms cost effective construction and green building. 2. Apply cost effective techniques in construction 3. Apply cost effective Technologies and Methods in Construction 4. Understand the Problems due to Global Warming 5. State the Concept of Green Buildings 6. Understand Green Buildings 		
UNIT – I		10 Hrs.
Introduction to the concept of cost effective construction Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo-Availability of different materials- Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials		
UNIT – II		10 Hrs.
Environment friendly and cost effective Building Technologies Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro-Cement and Ferro-Concrete constructions – different pre-cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies - Costford - Nirmithi Kendra – Habitat.		
Global Warming Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.		
UNIT - III		10 Hrs.
Green Building rating Systems BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Life cycle design of Materials and Structures (Concepts only)		
UNIT - IV		10 Hrs
Utility of Solar Energy in Buildings Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.		
Green Composites for Buildings Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment		

Reference Books::

1. K. S Jagadish, B. V. Venkataramana Reddy, K. N Nanjundarao "Alternative Building Materials and Technologies", New Age International Publishers.
2. G Harihara Iyer, "Green Building Fundamentals", Notion Press.
3. Dr. Adv. Harshul Savla, "Green Building: Principles & Practices", Notion Press.

Course Outcomes::

After completion of the course the students will be able to,

CO1: Select different building materials for cost effective construction

CO2: Apply effective environmental friendly building technology to reduce global warming

CO3: Analyse buildings for green rating systems.

CO4: Use alternate source of energy and effective use of water.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	-	-	-	1	1	-	-	-	-	-
CO2	2	1	-	-	-	1	1	-	-	-	-	-
CO3	2	1	-	-	-	1	1	-	-	-	-	-
CO4	2	1	-	-	-	1	1	-	-	-	-	-

22UCV139B/22UCV239B	WASTE MANAGEMENT	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. To learn broader understandings on various aspects of solid waste management. 2. To learn collection, storage, transport, processing, and disposal of waste. 3. To learn identification, management and treatment of hazardous waste. 		
UNIT – I		10 Hrs.
INTRODUCTION TO SOLID WASTE MANAGEMENT		
Classification of solid wastes (source and type based), Solid Waste Management (SWM), elements of SWM, (ESSWM) Environmentally Sound Solid Waste Management and (EST) Environmentally Sound Technologies, factors affecting SWM, Indian scenario, progress in (MSW) Municipal Solid Waste management in India.		
UNIT – II		10 Hrs.
WASTE GENERATION ASPECTS		
Waste Stream Assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions.		
UNIT – III		10 Hrs.
COLLECTION, STORAGE, TRANSPORT, PROCESSING TECHNIQUES AND DISPOSAL OF WASTES		
Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping, control, inventory and monitoring, implementing collection and transfer system, a case study. Waste Disposal: key issues in waste disposal, disposal options and selection criteria, sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues. Waste Processing Techniques: Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering.		
UNIT – IV		10 Hrs.
SOURCE REDUCTION, REUSE, PRODUCT RECOVERY & RECYCLING		
Refuse, Source Reduction, Reuse, Product Recovery and Recycling (SR's): basics, purpose, implementation monitoring and evaluation of source reduction, reuse, significance of recycling, planning of a recycling programme, recycling programme elements, commonly recycled materials and processes, recovery of waste materials, a case study.		
HAZARDOUS WASTE MANAGEMENT AND TREATMENT		
Identification and classification of hazardous waste, hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India.		
Reference Books:		
<ol style="list-style-type: none"> 1. Tchobanoglous, G., Theisen, H., and Samuel A Vigil, "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993. 2. Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H., "Waste Management", Springer, 1994. 3. White, F. R., Franke P. R. & Hindle M., "Integrated solid waste management: a life cycle inventory", Mc Dougall, P. John Wiley & Sons, 2001. 4. Nicholas, P., & Cheremisinoff, P. D., "Handbook of solid waste management and waste minimization technologies", Imprint of Elsevier Science, 2005. 		

Course Outcomes:**CO1:** Apply the basics of solid waste management towards sustainable development**CO2:** Study the composition and characteristics of the waste and its affect on the environment**CO3:** Apply technologies to process waste and dispose the same.**CO4:** Study the 5Rs, management and treatment of the hazardous waste.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	-	-	-	-	1	3	-	-	-	-	-
CO2	3	1	-	-	-	3	2	-	2	-	-	1
CO3	3	1	-	-	2	2	3	-	-	-	1	1
CO4	3	-	-	-	-	3	2	-	-	-	1	2

22UCS140B/22UCS240B	INTRODUCTION TO INTERNET OF THINGS (IoT)	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS.		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics. Understand the recent application domains of IoT in everyday life. Gain insights about the current trends of associated IOT technologies and IOT Analytics. 		
UNIT - I		10 Hrs.
Basics of Networking: Introduction, Network Types, Layered network models Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components		
UNIT – II		10 Hrs.
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.		
UNIT - III		10 Hrs.
Associated IoT Technologies Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. IoT Case Studies Agricultural IoT – Introduction and Case Studies		
UNIT - IV		10 Hrs.
IoT Case Studies and Future Trends Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction		
Reference Books:		
<ol style="list-style-type: none"> Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press, 2021. S. Misra, C. Roy, and A. Mukherjee, "Introduction to Industrial Internet of things and industry 4.0". CRC Press, 2020. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, A press Publications, 2013. 		
Course Outcomes:		
After completion of the course the students will be able to, CO1: Describe the evolution of IoT, IoT networking components and addressing strategies in IoT. CO2: Classify various sensing devices and actuator types. CO3: Demonstrate the processing in IoT. CO4: Explain associated IoT Technologies. CO5: Illustrate the architectures of IoT application.		

22UCS141B/22UCS241B	INTRODUCTION TO CYBER SECURITY	CREDITS: 03
L:T:P: 3:0:0		CIE Marks:50
TOTAL HOURS: 40HRS.		SEE Marks:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To familiarize cybercrime terminologies and perspectives 2. To understand Cyber Offenses and Botnets 3. To gain knowledge on tools and methods used in cybercrimes 4. To understand phishing and computer forensics 		
UNIT – I		10 Hrs.
Introduction to Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws.		
UNIT – II		10 Hrs.
How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercafe & cybercrimes. Botnets: The fuel for cybercrime, Attack Vector. Tools and Methods used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key Loggers and Spywares		
UNIT – III		10 Hrs.
Different Forms of attacks in Cybercrime: Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attackers, Attacks on Wireless networks. Phishing and Identity Theft: Introduction, phishing, methods of phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft		
UNIT – IV		10 Hrs.
Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.		
Reference Books:		
<ol style="list-style-type: none"> 1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt. Ltd, First Edition, 2011. 2. Rajkumar Singh Rathore, Mayank Bhushan, "Fundamentals of Cyber Security", BPB; First Edition, 2017. 3. Anand Shinde, "Introduction to Cyber Security", Notion Press, First Edition, 2020. 4. Nilakshi Jain and Dhananjay R. Kalbande, "Cyber Security and Cyber Laws", Wiley India Pvt. Ltd., 2020. 		
Course Outcomes:		
<p>After completion of the course the students will be able to,</p> <p>CO1: Explain the cybercrime terminologies and laws.</p> <p>CO2: Illustrate tools and methods used on Cybercrime</p> <p>CO3: Describe the different forms of attacks, Phishing and Identity Theft</p> <p>CO4: Comprehend cyber offences and Botnets</p> <p>CO5: Justify the need of computer forensics</p>		

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	-	-	-	-	-	-	2	-	-	-	-
CO2	-	2	-	3	3	-	-	-	-	-	-	-
CO3	-	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	2

22UME142B/22UME242B	COMPOSITE MATERIALS	CREDITS: 03
L:T:P: 3:0:0		CIEMARKS:50
TOTAL HOURS: 40HRS.		SEEMARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Explain the behavior of constituents in the composite materials 2. Enlighten the students in different types of reinforcement 3. Develop the student's skills in understanding the different manufacturing methods available for composite material. 4. Illuminate the knowledge of macro mechanical analysis and cutting and joining of the composite materials 		
UNIT-I		10 Hrs.
Introduction to composite materials		
Definition and classification of composites based on matrix and reinforcement, Characteristics of composite materials, Fibrous composites, Laminate composites and particulate composites.		
Factors which determine the properties of composites, Benefits of composites, properties and types of reinforcements and matrices, Reinforcement-matrix interface.		
UNIT-II		10 Hrs.
Polymer matrix composites		
Introduction, Polymer matrices, Processing methods like Layup and curing, open and closed mold process- hand layup techniques, laminate bag molding.		
Production procedures for bag molding, filament winding, pultrusion, pulforming, thermo-forming, molding methods, properties of PMCs and applications, Some commercial PMCs.		
UNIT-III		10 Hrs.
Metal matrix composites		
Introduction, Metallic matrices, Classification of MMCs, Need for production of MMCs, Interface reactions, processing methods like Powder metallurgy, diffusion bonding.		
Melt stirring, Compo/Rheo casting, Squeeze casting, Liquid melt infiltration, Spray deposition and In situ Processes, Properties of metal matrix composites, Applications, Some commercial MMCs.		
UNIT-IV		10 Hrs.
Cutting, Machining and Joining of Composites		
Continuous fibers, Iso-stress condition, Iso-strain condition, critical volume fraction of fiber and minimum volume fraction of fiber, Numericals on modulus of rigidity, and mechanics of discontinuous fibers.		
Cutting and machining of composites: Reciprocating knife cutting, cutting of cured composite, Joining of composites: Mechanical fastening, Adhesive bonding.		
Reference Books:		
<ol style="list-style-type: none"> 1. K. K. Chawla, "Composite Science and Engineering", , Springer Verlag, 1998. 2. Hull and Clyne, "Introduction to composite materials" Cambridge University Press, 2nd Edition, 1990. 3. F. L. Mathew and R. D. Rawlings, Composite Materials: Engineering and Science Woodhead Publishing Limited, 1999. 4. MeingSchwaitz, "Composite materials handbook", McGraw Hill Book Company, 1984. 5. Robert M. Jones, "Mechanics of Composite Materials", McGraw Hill Kogakusha Ltd, 1998. 6. S. C. Sharma, "Composite materials", Narosa Publishing House, 2000. 7. ArtarKaw, "Mechanics of composites", CEC Press, 2002. 		

Course Outcomes:

After completion of the course student will be able to

CO1: Solve the numerical problems on modulus of elasticity of the FRP composites.

CO2: Analyse the critical volume fraction of fibres in the FRP composites.

CO3: Synthesize polymer matrix and metal matrix composites.

CO4: Use the abrasive water jet machining of composites.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	1	-	-	-	-	-	-	1	-	1
CO2	1	2	1	-	-	-	-	-	-	1	-	1
CO3	-	1	1	2	-	-	-	-	-	1	-	1
CO4	-	-	1	1	2	-	-	-	-	1	-	1

21UME143B/21UME243B	INTRODUCTIONS TO ROBOTICS	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS.		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. Understand robot configuration, structures, basic components, workspace and generations of robots. 2. Get acquainted with performing spatial transformations and solve kinematics of the robot. 3. Learn about various sensors, actuators, robot programming. 4. Understand the present & future applications of a robot. 		
UNIT - I		10 Hrs.
Robot Basics		
Robot-Basic concepts, Need, Law, History, Anatomy, specifications. Robot configurations- cartesian, cylinder, polar and articulate. Robot wrist mechanism, Precision and accuracy of robot.		
Robot Elements		
End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation		
UNIT – II		10 Hrs.
Robot Kinematics and Control		
Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation.		
Control of robot manipulators – Point to point, Continuous Path Control, Robot programming		
UNIT – III		10 Hrs.
Robot Sensors		
Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors, Introduction to Machine Vision and Artificial Intelligence.		
UNIT – IV		10 Hrs.
Robot Applications		
Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management. Applications, Micro and Nano-robots, Future Applications.		
Reference Books:		
<ol style="list-style-type: none"> 1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata –McGraw Hill Pub. Co., 2008. 2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010. 3. Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd., 1994. 4. Fu.K.S, Gonzalez.R.C & Lee.C.S.G, "Robotics control, sensing, vision and intelligence", Tata-McGraw Hill Pub. Co., 2008 5. Yu. "Industrial Robotics", MIR Publishers Moscow, 1985. 		
Course Outcomes:		
After completion of the course student will be able to		
CO1: Comprehend the basic elements of industrial robots		
CO2: Analyse robot kinematics and its control methods.		
CO3: Classify the various sensors used in robots for better performance.		
CO4: Summarize various industrial and non-industrial applications of robots.		

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	1	-	-	-	-	1	-	1	-	-
CO2	1	2	1	-	-	-	-	1	-	1	-	-
CO3	-	1	1	2	-	-	-	1	-	1	-	-
CO4	-	-	1	1	2	-	-	1	-	1	-	-

22UBT148B/22UBT248B	BIOMASS AND BIOENERGY	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS.		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To understand the basic concepts of biomass and bioenergy. 2. To gain the knowledge about different biomass conversion technologies. 3. To know about innovative bioenergy plants and bio refinery concept. 		
UNIT - I		10 Hrs.
Biomass		
<p>Definition, constituents and energy properties. Biomass as an energy core and its different mode of utilization. Biomass typologies: lignocellulosic, starchy, sugary, oilseeds, MSW, sewage sludge.</p> <p>Introduction to Biofuels - definition (liquid -biodiesel, bioethanol; gaseous -syngas, biogas; solid - charcoal and biochar), advantages and disadvantages. Biofuel life cycle. Conventional fuels and their environmental impacts. Renewable energy sources. Modern fuels and their environmental impacts.</p>		
UNIT – II		10 Hrs.
Types of Bioenergies:		
<p>First generation, Second generation, third generation and next/future generation fuels Biomass Conversions Technologies:</p> <p>Physical conversion: Dewatering, drying, size reduction, steam explosion, densification, pelleting, chipping, oil extraction.</p> <p>Thermochemical conversion: Oil trans-esterification</p> <p>Chemical conversion: Lignocellulosic conversion (2G technology)</p> <p>Biochemical conversion: Anaerobic digestion (biogas production from organic waste and Waste water), CBG. Fermentation (bioethanol production)</p>		
UNIT - III		10 Hrs.
Thermal conversion:		
<p>Combustion plants for heat generation: wood and pellet burning stoves; wood, pellet and wood chips boiler. Gasification plants, Pyrolysis plants.</p> <p>Innovative bioenergy plants: biomass to synthetic natural gas; biomass to liquid biofuels through Fisher-Tropsch; absorption enhanced reforming. Hydrothermal processes: carbonization, Liquefaction, gasification.</p>		
UNIT - IV		10 Hrs.
Bio-Energy and Bio-Refinery		
<p>Overview of Integrated biorefinery concept, value-added processing of bioenergy residues. Economic feasibility of producing bioenergy (with one example), Issues with bioenergy production & use. Impact of bioenergy in global climate change & food production. Strategies for new vehicle technologies. Current research on biomass & bioenergy production. Market barriers of bioenergy.</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. Samir K. Khanal, Anaerobic Biotechnology for Bioenergy Production: Principles and Applications. Wiley-Blackwell Publishing, 2008. 2. E.J. Dasilva, C Ratledge & A Sasson, Biotechnology, Economic & Social Aspects; Cambridge Univ. Press, Cambridge, 2000. 3. Pradipta Kumar Mahopatra, Environmental Biotechnology 2007. 4. Caye M. Drapcho, Nghiem Phu Nhuan, Terry H. Walker, Biofuel Engineering Process Technology Mc Grow Hill company, 2008. 5. Dominik Rutz & Rainer Janssen, Biofuel Technology Handbook 2008. 		

Course Outcomes:

After completion of the course student will be able to

CO1: Emphasize on the basic aspects of Biomass and Bio-Energy.

CO2: Interpret and describe biomass conversion technologies.

CO3: Acquire knowledge of innovative bioenergy plants.

CO4: Interpret and describe of Bio-Refinery concept.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	2	-	-	-	3	-	-	-	-	2
CO2	1	3	3	2	3	1	3	-	-	-	-	1
CO3	1	1	3	2	3	1	3	-	-	-	-	1
CO4	1	-	2	-	2	1	2	-	-	-	-	2

22UCS130B/22UCS230B	INTRODUCTION TO WEB PROGRAMMING (INTEGRATED)	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS:50
TOTAL HOURS: 46HRS. (26T+20P)		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To use the syntax and semantics of HTML and XHTML 2. To develop different parts of a web page 3. To understand how CSS can enhance the design of a webpage. 4. To create and apply CSS styling to a webpage 		
UNIT-I		08 Hrs.
Fundamentals of WEB: Introduction to Internet, World Wide Web, Web Browsers, Web Servers, Uniform Resource-Locators, MIME, HTTP. Traditional HTML and XHTML: First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: Document Type Statements and Language Versions, (X) HTML Document Structure, Browsers and (X) HTML, The Rules of (X) HTML, Major Themes of (X) HTML.		
UNIT-II		06 Hrs.
HTML5: Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics: HTML5's Open Media Effort, HTML5 Form Changes.		
UNIT-III		06 Hrs.
Cascading Style Sheets (CSS): Introduction, CSS Overview , CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, , Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property .		
UNIT-IV		06 Hrs.
Tables and CSS, Links and Images: Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo- Class Selectors, thead and tbody Elements, Cell Spanning. CSS display Property with Table Values, Links and Images: a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG.		
Reference Books:		
<ol style="list-style-type: none"> 1. Thomas A. Powell,The Complete Reference HTML & CSS (Fifth Edition), Tata McGraw Hill. 2. John Dean,WEB PROGRAMMING with HTML5CSS and JavaScript(First Edition), Jones & Bartlett Learning. 3. Chris Bates,WEB PROGRAMMING (Second Edition), Wiley. 		

Programming Assignments:

1. To create a simple html file to demonstrate the use of different tags.

Create an html page named as "Basic_Html_Tags.html" and add the following tags

- a) Different heading tags (h1 to h6)
- b) Paragraph
- c) Horizontal line
- d) Line Break
- e) Pre tag
- f) Different Logical Style (,<u>,<Sup>,<sub>)

2. Create a HTML code to display the following web page using list.

Learning Web Development

- I. Background Skills
 - A. Unix Commands
 - B. Vim Text Editor
- II. HTML
 - A. Minimal Page
 - B. Headings
 - C. Tags
 - D. Lists
 - i. Unordered
 - ii. Ordered
 - iii. Definition
 - iv. Nested
 - E. Links
 - i. Absolute
 - ii. Relative
 - F. Images

3. Create an html page named as "Table.html" to display the following table.

NAME	SUBJECT	MARKS
Hillary	Advanced Web	75
	Operating Syatem	60
Lary	Advanced Web	80
	Operating Syatem	75
Total Average:		72.5

1. Create an internal style sheet to define the following CSS properties for element(s) on your page:
 - a. text-decoration
 - b. text-align
 - c. font-size
 - d. font-family
 - e. font-weight
2. Create an external style sheet to define the following CSS properties for element(s) on your page:
 - a. background-color
 - b. color
 - c. margin-xxx (left, right, top, or bottom)
 - d. padding
 - e. border-style , border-color , border-width
3. To create HTML code to insert image and to add a link to a web page.
4. Write a HTML code to perform the following CSS properties
 - a. Text Properties
 - text-color

- text-align
- text-decoration
- text-transformation

b. Font Properties

- font-style
- font-size
- font-family

5. Create a HTML code to display following output(using box properties)

Demonstrating the Box Model



6. Create the following table using CSS properties.

Roll No	Name	Team
1001	John	Red
1002	Peter	Blue
1003	Henry	Green

7. Create a HTML code for simple registration form which include

- i. Firstname
- ii. Middlename
- iii. Lastname
- iv. Course with option button
- v. Gender with radio button
- vi. Phone No
- vii. Address
- viii. Submit and reset button

22UCS131B/22UCS231B	INTRODUCTION TO PYTHON PROGRAMMING	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS: 50
TOTAL HOURS: 46HRS. (26T+20P)		SEE MARKS: 50
Course objectives		
<ol style="list-style-type: none"> 1. Learn the syntax and semantics of the python programming languages 2. Illustrate the process of structuring the data using list, tuples, string and dictionaries 3. Demonstrate the use of built-in function to navigate the file system 		
UNIT – I		07 Hrs.
Python Basics		
Our first python script, Comments, Basic data types, Identifiers, Keywords, variables, basic input and output: printing using the print function, Taking input using the input function		
Python control structures:		
Getting started with programs, decisions, loops, terminating control		
UNIT – II		06 Hrs.
Lists:		
Creating lists, Accessing list elements, counting list elements, Iterating through list elements, searching elements within lists, list slices, adding and deleting elements, adding multiplying and copying lists, simple programs on lists, nested lists		
Tuples: Creating Tuples, accessing tuple elements, counting tuple elements, Iterating through tuple elements, searching elements within tuples, tuple slices, adding multiplying and copying tuples, comparison of tuples and lists, simple programs		
Introduction to sets: Creating sets, Accessing set elements, Iterating through set elements		
UNIT – III		06 Hrs.
Strings:		
Conversion from and to strings, searching in strings, splitting strings, joining strings, modifying strings, padding strings		
Dictionaries:		
Creating Dictionaries, accessing Dictionary elements, counting Dictionary elements, Iterating through Dictionary elements, searching elements within Dictionaries, adding and deleting Dictionary, comparison simple programs		
UNIT – IV		07 Hrs.
Functions:		
Introduction to functions, function definitions, function call, positional arguments, default arguments, keyword arguments, variable arguments, returning from functions,		
Files:		
Introduction to file handling, opening and closing files, reading from text files, writing to text files, seeking within files, reading to binary files, writing to binary files		

Programming Exercises:

1. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
2. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
3. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
4. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
5. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
6. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
7. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use
8. Dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]
9. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip (), len (), list methods sort (), append (), and file methods open (), read lines (), and write ()].
10. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
11. Write a function named DivExp which takes TWO parameters a, b and returns a value c ($c=a/b$). Write suitable assertion for $a>0$ in function DivExp and raise an exception for when $b=0$. Develop a suitable program which reads two values from the console and calls a function DivExp.
12. Write python program to implement simple library system using dictionary: Library = { ISBN1 : [No of copies, title, author] . . . } to support i) add new book ii) issue book iii) Return book operations
13. Given price list: {item1: amt, item2: amt . . .} and list of items purchased, write python program to find amount to be paid for purchased items.
14. Ex: pricelist ; { "pen":10, "Notebook":50, "book":100} Items_purchased = ["pen", "book"]
15. o/p: amt_to_be_paid = 110

Reference Books:

1. B. Nagesh Rao, "Learning Python", Cyberplus publication, 2nd edition
2. Gaowrishankar S., Veena A, "Introduction to python programming", CRC press
3. Al Sweigart, "Automate the boring stuff with Python", No Starch press, 1st Edition, 2015.
4. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Green Tea Press, 2nd Edition, 2015.

Course Outcomes:

After completion of the course the students will be able to:

CO 1: Explain the syntax and semantics of different statements and functions.

CO 2: Demonstrate the use of strings, files, lists, tuples, dictionaries and exceptions

CO 3: Develop the solution to a given problem by selecting appropriate data types and modules

CO 4: Able to create, read data from and write data to files

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	1	-	-	-	-	-	-	2
CO3	-	3	3	1	2	-	-	-	-	-	-	2
CO4	-	3	3	1	2	-	-	-	-	-	-	2

22UCS132B /22UCS232B	BASICS OF JAVA PROGRAMMING	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS: 50
TOTAL HOURS: 46HRS. (26 T+20 P)		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. Learn fundamental features of object oriented language and JAVA 2. Set up Java JDK environment to create, debug and run simple Java programs. 3. Learn object oriented concepts using programming examples. 4. Study the concepts of importing of packages and exception handling mechanism. 		
UNIT – I		07 Hrs.
An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings		
UNIT – II		06 Hrs.
Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The? Operator, Operator Precedence, Using Parentheses, Control Statements: Java`s Selection Statements, Iteration Statements, Jump Statements.		
UNIT – III		06 Hrs.
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited.		
UNIT – IV		07 Hrs.
Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class. Text book 1: Ch 8.		
Reference Books:		
<ol style="list-style-type: none"> 1. Herbert Schildt, Java the Complete Reference, 7th Edition, Tata McGraw Hill, 2007. Web links and Video Lectures (e-Resources): <ul style="list-style-type: none"> ● https://onlinecourses.nptel.ac.in/noc22_cs47/preview 		
Programming Exercises		
<ol style="list-style-type: none"> 1. Develop simple java programs to demonstrate the use of conditional statements 2. Develop simple java programs to demonstrate the use <ol style="list-style-type: none"> i. loop statements ii. Reading & printing different data types in java 3. Develop simple java programs on arrays(single & multidimensional) & recursion 4. Develop simple java programs to demonstrate Interfaces concept 5. Develop simple java programs to demonstrate Polymorphism mechanisms 6. Develop simple java programs to demonstrate Inheritance concept 7. Develop simple java programs to demonstrate Package concept 8. Develop simple java programs to demonstrate exception handling 9. Develop simple java programs to demonstrate use of Constructors 		

22UCS133B /22UCS233B	INTRODUCTION TO C++ PROGRAMMING	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS:50
TOTAL HOURS: 46HRS. (28T+20P)		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object. 2. Understand the concept of structure and functions 3. Understand the capability of a class to relay upon another class and functions. 4. Understand about constructors which are special type of functions. 5. Understand the concept of polymorphism and inheritance. 		
UNIT-I		10 Hrs.
Introduction: Features of object oriented programming, C++ and C , C++ overview, Layout of C++ Program, Cin and Cout statements, Preprocessor directives, Comments, Manipulators, Data types, variables, constants, Arithmetical operators, Logical operators, Relational operators, Conditional operators, Loops and Decisions: for- loop, while loop, do-while loop, if statement, if-else statement, else-if statement, switch statement.		
UNIT-II		10 Hrs.
Structures: A simple structure, defining a structure, defining structure variables, accessing structure members, Functions: Simple functions, passing arguments to functions, returning value to a function, overloaded functions.		
UNIT-III		10 Hrs.
Class and Objects: Class specification, Access Specifiers, Defining Member Function, Objects Declaration, Accessing Data members and Member Function, Constructors, parameterized constructor, Destructors.		
UNIT-IV		10 Hrs.
Inheritance& Polymorphism: Derived class Constructors, destructors-Types o inheritance-Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance.		
Reference Books:		
<ul style="list-style-type: none"> • Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publishing • Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt.Ltd , Fourth Edition 2010. <p>Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> • Basics of C++ - https://www.youtube.com/watch?v=BCIS40yzssA • Functions of C++ - https://www.youtube.com/watch?v=p8ehAjZWjPw • Tutorial Link: https://www.w3schools.com/cpp/cpp_intro.asp • https://www.edx.org/course/introduction-to-c- 		
Programming Assignments:		
<ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. Write a C++program to find the sum of all the natural numbers from 1to n. b. Write a C++ program to find the factorial of a given number c. Write a C++ program to find the given number is prime or not 2. Write a C++ program to make a simple calculator. 3. Write a C++ program to declare Strut. initialize and display contents of member variables 4. Write a C++program to demonstrate function overloading for the following prototypes.Add (int a, int b) Add (double a , double b) 5. Write a C++ program to find Area of square, rectangle ,circle and triangle using Function 		

22UHS124C	COMMUNICATIVE ENGLISH	CREDIT: 01
L:T:P: 1:0:0		CIE MARKS:50
TOTAL HOURS: 15 HRS.		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To know about fundamentals of communicative english and communication skills in general. 2. To train the students and identify the nuances of phonetics, intonation and enhance pronunciation skills for better communication skills. 3. To impart basic English grammar and essentials of important language skills. 4. To enhance with English vocabulary and language proficiency for better communication skills. 5. To learn about techniques of information transfer through presentation. 		
UNIT - I		3 Hrs.
Introduction to Communication Skills: Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.		
UNIT – II		4 Hrs.
Introduction to Phonetics: Phonetics and its importance, Phonetic Transcription, Pronunciation Guidelines Related to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables & Structure, Word Accent and Stress Shift, Intonation, Spelling Rules & Words often Miss spelt. Common Errors in Pronunciation.		
Basic English Grammar and Vocabulary PART- I: Introduction to English Grammar, Parts of Speech.		
UNIT - III		4 Hrs.
Basic English Grammar and Vocabulary PART - II: Articles and Preposition, kinds of Preposition and Prepositions often Confused. Articles: Use of Articles – Indefinite and Definite Articles, Verbs and Tenses, Types of tenses, Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags. One Word Substitutes. Strong and Weak forms of words, Word formation - Prefixes and Suffixes, Contractions and Abbreviations.		
UNIT - IV		4 Hrs.
Communication Skills for Employment: Information Transfer & Its types: Oral Presentation & Extempore/Public Speaking, Difference between Extempore/Public Speaking, Communication Guidelines for Practice. Mother Tongue Influence (MTI) – South Indian Speakers, Various Techniques for Neutralization of Mother Tongue Influence.		
Reference Books:		
<ol style="list-style-type: none"> 1. Infinite Learning Solutions “A Textbook of English Language Communication Skills” (Revised Edition) 2021. 2. Sanjay Kumar and Pushpalata “Communication Skills”, Oxford University Press - 2019. 3. N. P. Sudharshana and C. Savitha, “English for Engineers”, Cambridge University Press – 2018. 4. D Praveen Sam, KN Shoba, “A Course in Technical English”, Cambridge University Press – 2020. 5. Gajendra Singh Chauhan and Et al, “Technical Communication”, Cengage learning India Pvt. Limited 2019. 6. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt. Limited 2019. 		

22UHS128C/22UHS228C	SCIENTIFIC FOUNDATIONS OF HEALTH	CREDIT: 01
L:T:P: 1:0:0		CIE MARKS:50
TOTAL HOURS:15 HRS.		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To know about health and wellness (and its Beliefs) & It's balance for positive mindset. 2. To build the healthy lifestyles for good health for their better future. 3. To create a healthy and caring relationships to meet the requirements of good/ social/ positive life. 4. To learn about avoiding risks and harmful habits in their campus and outside the campus for their bright future. 5. To prevent and fight against harmful diseases for good health through positive mindset. 		
UNIT – I		4Hrs.
Good Health and Its balance for positive mindset: What is Health? Health and Behaviour. Health and Personality - Profession: Disparities of health in different vulnerable groups. Stress and Health - Stress management.		
UNIT – II		4Hrs.
Building of healthy lifestyles for better future: Developing a healthy diet for good health, Fitness components for health, Wellness and physical function, How to avoid exercise injuries? Creation of Healthy and caring relationships: Building communication skills (Listening and speaking), Changing health behaviours through social engineering.		
UNIT – III		4Hrs.
Avoiding risks and harmful habits: Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, Effects and health hazards from addictions Such as how to recovery from addictions.		
UNIT – IV		3Hrs.
Preventing and fighting against diseases for good health: Process of infections and reasons for it, Management of chronic illness for Quality of life, Health and Wellness of youth.		
Reference Books:		
<ol style="list-style-type: none"> 1. Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor, Health Psychology (Second edition) Published by Routledge 711 Third Avenue, New York, NY 10017. 2. Health Psychology - A Textbook, 4th edition by Jane Ogden McGraw Hill Education (India) Pvt. Ltd. - Open University Press 3. Scientific Foundations of Health (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher. 4. Shelley E. Taylor, Health Psychology (Ninth Edition), University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press 5. SWAYAM / NPTEL/ MOOCs/ We blinks/ Internet sources/ YouTube videos and other materials / notes 		
Course Outcomes:		
After completion of the course student will be able to		
CO1: Understand concepts of Good Health and wellness (and its Beliefs).		
CO2: Demonstrate the abilities to build healthy, caring relationships and life style		
CO3: Adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus.		
CO4: Exhibit the abilities to fight against harmful diseases.		

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	1	-	-	-	-	-	-
CO2	-	-	-	-	-	2	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	-	-	-	-	-

22UMA202C	MATHEMATICS FOR CIVIL SCIENCES-II (INTEGRATED)	CREDITS:04
L:T:P: 3:0:2		CIE Marks : 50
Total Hours : 60 (40L+20 P)		SEE Marks : 50
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students theoretical and applied mathematical skills. 2. State the need for Mathematics with Engineering Studies and Provide real-life examples. 3. Support and guide the students for self–study. 4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress. 5. Encourage the students to group learning to improve their creative and analytical skills. 		
UNIT-I		10 Hrs.
<p>Integral Calculus Introduction to Integral Calculus in Civil Engineering applications : Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.</p>		
UNIT-II		10 Hrs.
<p>Vector Calculus Introduction to Vector Calculus in Civil Engineering applications: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and Flux. Statement of Green's theorem and Stokes theorem. Problems. Self-Study: Volume integral and Gauss divergence theorem. Applications: Heat and mass transfer, oil refinery problems, environmental engineering. Analysis of streamlines, velocity and acceleration of a moving particle.</p>		
UNIT-III		10 Hrs.
<p>Partial Differential Equations (PDEs) Importance of partial differential equations for Civil Engineering applications: Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous, PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation. Self-Study: Solution of one-dimensional heat equation and wave equation by the method of separation of variables. Applications: Design of structures (vibration of rod / membrane)</p>		

Numerical Methods**Introduction to various numerical techniques for handling Civil Engineering applications:**

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.

Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems.

Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.

Self-Study: Bisection method, Lagrange's inverse Interpolation and Adam-Bashforth method.

Applications: Estimating the approximate roots, extremum values, Area, volume, and surface area. Finding approximate solutions to civil engineering problems. Finding approximate solutions to ODE related to civil engineering fields.

List of experiments

- 1 Program to calculate double integration of the given function under the given limits
 - i. Evaluate double integration of $\exp(x+y)$ between the limits (0,1) and (0,1) and verify the answer is 2.9524924.
 - ii. Evaluate double integration of $\exp(x+y)$ between the limits (0,1) and (0,2) and verify the answer is 10.978199.
 - iii. Evaluate double integration of $\exp(x+y)$ between the limits (0,2) and (0,2) and verify the answer is 40.820038.
 - iv. Evaluate double integration of $\exp(x+y)$ between the limits (1,2) and (0,2) and verify the answer is 29.841839.
 - v. Evaluate double integration of $\exp(x+y)$ between the limits (1,2) and (1,2) and verify the answer is 21.816132.
 - vi. Evaluate double integration of x^2+y^2 between the limits (1,2) and (1,2) and verify the answer is 4.6666667.
 - vii. Evaluate double integration of x^2+y^2 between the limits (0,2) and (1,2) and verify the answer is 7.3333333.
 - viii. Evaluate double integration of x^2+y^2 between the limits (0,2) and (0,2) and verify the answer is 10.6666667.
 - ix. Evaluate double integration of x^2+y^2 between the limits (0,1) and (0,2) and verify the answer is 3.3333333.
 - x. Evaluate double integration of x^2+y^2 between the limits (0,1) and (0,1) and verify the answer is 0.6666667.
- 2 Program
 - i. To calculate the gradient of the tangent to the given angle.
 - ii. To calculate the gradient of the tangent to the given points.
 - iii. To calculate the gradient of the tangent to the given curve using numerical derivatives.
 - iv. To calculate the gradient of the tangent to the given curve using derivatives.

- 3 Program
 - i. To find the divergence of the given function at the given point.
 - ii. To find the curl of the given function at the given point.
- 4 Program to find the Solution of algebraic or transcendental equations by Newton-Raphson method
- 5 Program
 - i. To calculate Newton forward difference for a given point.
 - ii. To calculate Newton backward difference for a given point.
- 6 Program to calculate trapezoidal rule
- 7 Program
 - i. To calculate simpsons1/3 rule
 - ii. To calculate simpsons3/8 rule
- 8 Program
 - i. To calculate ode by Taylors series.
 - ii. To calculate ode by modified Euler's method
- 9 Program to find the solution of ode by Runge Kutta method
10. Program to find the solution of ode by Milne predictor corrector method.

Reference Books:

1. Maurice D weir, Joel Hass and Frank R. Giordano, "Thomas calculus", Pearson, eleventh edition, 2011
2. B.S. Grewal : Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
3. B. V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Erwin Kreyszing's Advanced Engineering Mathematics volume1 and volume1I,wiley India Pvt.Ltd.,2014
5. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press,3rd Ed., 2016.
6. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
7. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., Newyork, 6th Ed., 2017.
8. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
9. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
10. James Stewart: "Calculus" Cengage Publications, 7th Ed., 2019.
11. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
12. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.

22UCH110C/22UCH210C	CHEMISTRY FOR CIVIL SCIENCES (INTEGRATED)	CREDITS:04
L:T:P: 3:0:2		CIE MARKS:50
TOTAL HOURS: 60HRS.. (40T + 20P)		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To enable students to acquire knowledge on principles of chemistry for engineering applications. 2. To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering. 3. To provide students with a solid foundation in analytical reasoning required to solve societal problems. 		
UNIT-I		10 Hrs.
Chemistry of Water and Environment		
<p>Water technology: Introduction, water quality parameters, hardness of water, determination of all types of hardness by EDTA method, numerical problems. Determination of chlorides; Mohr's method. Softening of water by ion exchange method, desalination of water by electrodialysis, Reverse and Forward osmosis: Introduction, Process and applications.</p> <p>Water pollution: Sources, Potable water quality parameters, Sewage, Aerobic and Anaerobic Oxidation. Sewage treatment; Primary, secondary (activated sludge process) and tertiary treatment. Industrial waste water treatment. Determination of Biological Oxygen Demand (BOD), Chemical oxygen demand (COD) and Numerical problems.</p> <p>Self Study: Determination of DO in water samples by Winkler's method. Impact of heavy metals on human health.</p>		
UNIT-II		10 Hrs.
Corrosion Science and Analytical Techniques		
<p>Corrosion: Introduction, electrochemical theory of corrosion, types of electrochemical corrosion; differential metal corrosion, differential aeration corrosion (waterline and pitting), stress corrosion (caustic embrittlement). Factors affecting rate of corrosion. Corrosion testing by weight loss method. Corrosion penetration rate (CPR)-numerical problems.</p> <p>Corrosion control: Introduction, Metal coating; galvanization, Surface conversion coating; anodization and cathodic protection; sacrificial anodic method.</p> <p>Analytical Techniques: Sensors, Introduction, basic principle of sensor, Types of chemical sensors; Conductometric sensors, Electrochemical sensors and Optical sensors. Potentiometric sensors; Introduction, principle, working and application in the estimation of iron. Colorimetric sensors; Introduction, principle, working and application in the estimation of copper. Conductometric sensors; Introduction, principle, working and application in the estimation of weak acid. pH-sensors and its application in the determination of soil sample.</p> <p>Self Study: Use of Corrosion inhibitors to control corrosion. Corrosion control by organic coatings.</p>		
UNIT-III		10 Hrs.
Structural Materials		
<p>Metals and Alloys: Introduction, Properties and application of Iron and its alloys (Eg. Wrought iron and steel). Aluminium and its alloys (Eg. Duralium and Magnalium)</p> <p>Cement: Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement.</p> <p>Refractories: Introduction, classification based on chemical composition, properties and application of refractory materials.</p> <p>Nano materials: Introduction, Size dependent properties of nanomaterials - surface area and catalytic, Thermal, Electrical, Optical, Magnetic and Mechanical properties. Synthesis of nanomaterials by sol-gel method and co-precipitation method. Synthesis of carbon nanotubes by Chemical Vapour Deposition (CVD) method, properties and engineering applications. Nanomaterials for water treatment, Introduction</p>		

and example.

Self Study: Glass - Introduction, Composition, Types, Properties and applications

UNIT-IV

10 Hrs.

Polymers and Composites

Polymer: Introduction, monomer, polymer, polymerization, degree of polymerization, Glass transition temperature (T_g); Factors affecting T_g of a polymer. Molecular weight of polymers, Weight average and number average molecular weight of polymer. Polydispersity in polymers. Numerical problems. Synthesis, properties and engineering applications of Acrylo Butadiene Styrene (ABS) plastics and Silicon rubber. Adhesives - Introduction, Synthesis, Properties and applications of epoxy resin.

Fibers: Introduction, Synthesis, Properties and applications of Rayon and Nylon fibers.

Polymer composites: Introduction, FRPC (Fiber reinforced polymers composites) - Types, properties and applications.

Geo polymer concrete: Introduction, constituents, properties & applications.

Biodegradable polymers: Introduction, Synthesis, properties and applications of polylactic acid (PLA) and poly hydroxy butyrate (PHB).

Self Study: Inorganic polymers – Introduction, Types, Polysulphides - Synthesis, Properties and applications.

List of Experiments:

Compulsory conducting experiments

1. Estimation of total hardness of water by EDTA method
2. Potentiometric estimation of FAS using K₂Cr₂O₇
3. Determination of pK_a of vinegar using pH sensor (Glass electrode)
4. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
5. Conductometric estimation of acid mixture
6. Estimation of iron in TMT bar by diphenyl amine/external indicator method
7. Determination of Alkalinity of given water sample by dual indicator method.
8. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

Virtual experiments (any one)

1. Electro-gravimetric estimation of metals
2. Preparation of urea formaldehyde resin
3. Synthesis of iron oxide nanoparticles
4. Electrolysis of water

Open Ended Experiments (Suggestive - any one)

1. Precipitation titration
2. Determination of percentage of copper present in given brass piece
3. Determination of percentage of CaO in cement solution
4. Determination of manganese dioxide in pyrolusite ore

Reference Books:

1. Subha Ramesh etl. "Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi, - 2nd Edition, 2013
2. SS Dara & Dr. SS Umare, "A Text book of Engineering Chemistry", S Chand & Company Ltd., 12th Edition, 2011.
3. R.V. Gadag and Nityananda Shetty, "A Text Book of Engineering Chemistry", I. K. International Publishing house. 2nd Edition, 2016.
4. F.W. Billmeyer, "Text Book of Polymer Science", John Wiley & Sons, 4th Edition, 1999.
5. G.A. Ozin & A.C. Arsenault "Nanotechnology A Chemical Approach to Nanomaterials", , RSC

Publishing, 2nd Edition 2005.

6. M. G. Fontana, N. D. Greene "Corrosion Engineering", McGraw Hill Publications, New York, 3rd Edition, 1996.
7. Takatoshi Tsujimura, "OLED Display Fundamentals and Applications", Wiley–Blackwell, 1st Edition 2012
8. "Laboratory Manual, Department of Chemistry", BEC Bagalkot 2023 Edition
9. Dr. Sudha Rani, Dhanapath Rai "Laboratory Manual on Engineering Chemistry", Publishing Co. Ltd., 1st Edition, 1998

Web links and Video Lectures (e-Resources):

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWWh>

Course Outcomes:

At the end of the course the will be able to

1. Evaluate quality of water and its treatment methods for domestic and Industrial applications.
2. Identify and evaluate composition of materials and mechanism involved in corrosion with controlling measures.
3. Outline the application of structural materials for engineering application.
4. Outline the various polymers and their properties with application in various Engineering field.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	-	-	1	-	-	-	-	-
CO2	3	1	1	-	-	-	1	-	-	-	-	-
CO3	3	1	1	-	-	-	1	-	-	-	-	-
CO4	3	1	1	-	-	-	1	-	-	-	-	-

22UME223C	COMPUTER AIDED ENGINEERING DRAWING	CREDITS:03
L:T:P: 3:0:2		CIE MARKS:50
TOTAL HOURS: 40HRS. (28T +12P)		SEE MARKS:50
Course Objectives: <ol style="list-style-type: none"> 1. To understand the basic principles and conventions of engineering drawing and to generate projection of points and lines 2. To generate orthographic projections of planes using CAD software 3. To generate orthographic projections of solids and development of lateral surfaces of solids using CAD software 4. To understand the isometric projections and freehand sketching 		
UNIT-I		6 Hrs..
<p>Introduction: Significance of engineering drawing, BIS Conventions of Engineering Drawing. Free hand sketching of Engineering Drawing. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, and RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.</p> <p>Orthographic Projections of Points and Lines: Introduction to Orthographic projections: Orthographic projections of points in 1st and 3rd quadrants (for practice only, not for CIE and SEE).</p> <p>Projections of lines located in first quadrant only, line parallel to both the planes, perpendicular to one plane and parallel to other, inclined to one plane and parallel to other, inclined to both the planes. Determinations of true length and true inclinations with principal planes.</p>		
UNIT-II		6 Hrs..
<p>Orthographic Projections of planes: Projections of planes- perpendicular to the both the planes, parallel to one plane and perpendicular to other, inclined to one plane and perpendicular to other and inclined to both the planes.(Placed in First quadrant only using change of position method).</p>		
UNIT-III		6 Hrs..
<p>Orthographic Projections of solids Orthographic Projection of right regular solids (Solids Resting on HP only): Prisms, Pyramids, Cones, and Cylinders (triangle, square, rectangle, pentagon, and hexagon) with axis/base inclined to HP and profile views.</p> <p>Development of Lateral Surfaces of Solids Development of Lateral Surfaces of right regular prisms, pyramids, cylinders and cones resting with base on HP only</p>		
UNIT-IV		8 Hrs..
<p>Isometric Projections: Isometric scale, Isometric Projection of hexahedron (cube), right regular prisms, pyramids, Cylinders, Cones and spheres. Isometric Projection of combination of two simple solids (Co-Axial only).</p>		

Free hand Sketching:

True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc.
 Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four-wheeler carts etc.. (Free hand sketches)

Reference Books:

1. K.R.Gopalkrishna, "*Engineering Drawing*", vol. I and II, 23rd Edition, Subhas, 2014.
2. N.D.Bhat "*Engineering Drawing*"
3. R.K.Hegde and Niranjana Murthy, "*Engineering Graphics*" 1st Edition, Sapna, 2003.
4. P.I.Varghese, "*Engineering Graphics*", McGraw Hill, 2013.

Course Outcomes:

At the end of the course the student will be able to:

CO 1: Draw and communicate the objects with definite shape and dimensions

CO 2: Recognize and draw the shape and size of objects through different views.

CO 3: Develop the lateral surface of the objects

CO 4: Draw isometric views and freehand sketches of mechanisms and simple machine parts

CO 5: Create a drawing views using CAD software.

Course Outcomes	Programme Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	3	1	-	1	1	3	-	1
CO2	3	2	-	-	3	1	-	1	1	3	-	1
CO3	3	2	-	-	3	1	-	1	1	3	-	1
CO4	3	2	-	-	3	1	1	-	-	3	-	1
CO5	3	2	-	-	3	1	-	-		3	-	1

22UME122N/22UME222N	INTRODUCTION TO MECHANICAL ENGINEERING	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS.		SEE MARKS:50
Course Objectives:		
6. Acquire a basic understanding about scope of mechanical engineering, different energy sources.		
7. Acquire a basic knowledge about conventional and advanced manufacturing processes.		
8. Acquire a basic understanding about IC engines.		
9. Acquire a basic knowledge about joining processes and CNC machines.		
10. Acquire a basic insight into future mobility, mechatronics, robotics and IoT.		
UNIT-I		10Hrs..
Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.		
Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion		
Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys.		
UNIT-II		10Hrs..
Machine Tool Operations:		
Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working of Milling Machine, Milling operations: plane milling and slot milling.		
(No sketches of machine tools, sketches to be used only for explaining the operations).		
Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.		
Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.		
UNIT-III		10 Hrs..
Introduction to IC Engines: Components and Working Principles, 4-Stroke Petrol and Diesel Engines, Application of IC Engines.		
Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.		
UNIT-IV		10Hrs..
Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.		
Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages		
Introduction to IOT: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.		
Reference Books:		
1. Hazra Choudhry and Nirzar Roy, "Elements of Workshop Technology" Vol. 1 and 2, Media Promoters and Publishers Pvt. Ltd., 2010.		
2. P.N.Rao, "Manufacturing Technology- Foundry, Forming and Welding", Tata McGraw Hill 3 rd Edition 2003.		
3. V. Ganesan, "Internal Combustion Engines", Tata McGraw Hill Education; 4 th edition, 2017.		

5. Appu Kuttan KK K “Robotics”, International Pvt. Ltd, volume 1
6. Dr SRN Reddy, RachitThukral and Manasi Mishra, “ Introduction to Internet of Things: A Practical Approach”, ETI Labs
7. Raj kamal, “Internet of Things: Architecture and Design”, McGraw hill.
8. K R Gopala Krishna, “Elements of Mechanical Engineering” , Subhash Publications, 2008
9. Jonathan Wickert and Kemper Lewis, “An Introduction to Mechanical Engineering”, 3rd Edition, 2012.

Course Outcomes:

After completion of the course the students will be able to,

- CO1:** Explain the role of Mechanical Engineering with respect to the emerging trends and technologies in various sectors, knowledge of various sources of energy and engineering materials
- CO2:** Describe different conventional, advanced manufacturing systems and various metal joining processes
- CO3:** Compute and analyze the performance of IC engines used in automobiles and concept of electric and hybrid vehicles for future mobility
- CO4:** Enlighten about the fundamentals of Mechatronics, Robotics, Automation in industry and IOT

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	1	1	-	-	-	1
CO2	2	2	-	-	1	1	1	-	-	-	-	1
CO3	2	1	-	-	1	1	-	-	-	-	-	1
CO4	2	1	-	-	1	1	-	1	1	-	-	1

22UEE116N/22UEE216N	INTRODUCTION TO ELECTRICAL ENGINEERING	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS.		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. To understand the working of Hydro –electric, Thermal and Nuclear power plants 2. To determine current, voltage, and power in various branches by applying electric circuit theorems to DC and AC (single phase and three phase) circuits 3. To analyze the working principle and construction to identify the suitable applications of DC generators, motors and transformers by identifying the specifications 4. To identify the safety aspects in different types of wiring mechanisms and evaluate the energy consumption in domestic loads 		
UNIT – I		10 Hrs.
<p>Introduction: General structure of electrical power systems using single line diagram approach.</p> <p>Power Generation: Hydel, thermal, nuclear power plants (block diagram approach).</p> <p>DC Circuits: Ohm’s law and its limitations, KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.</p>		
UNIT – II		10 Hrs.
<p>AC. Fundamentals: Equation of AC voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor (only definitions), voltage and current relationship with phasor diagrams in R, L, and C circuits, concept of impedance, analysis of R-L, R-C, R-L-C series circuits, active power, reactive power and apparent power, concept of power factor. (Simple Numerical).</p> <p>Three Phase Circuits: Generation of three phase AC quantity, advantages and limitations, star and delta connection, relationship between line and phase quantities (excluding proof)</p>		
UNIT – III		10 Hrs.
<p>DC Generator, DC Motor, Transformers: Working principle, construction, equations, types and classifications, specifications, applications, cost. Simple numerical.</p>		
UNIT – IV		10 Hrs.
<p>Domestic Wiring: Requirements, Types of wiring, Two way and three way control of loads.</p> <p>Electrical Energy Calculation: Power rating of household appliances, two-part electricity tariff, calculation of electricity bill for domestic consumers.</p> <p>Electrical Safety Measures: Equipment: Types of equipment, voltage and current issues, safety. Human: Electric shock, effect of shock on body, factors affecting severity of shock, safety precautions.</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. B.L Theraja, “Fundamentals of Electrical Engineering and Electronics”, S. Chand Publications, 27th Edition, 2014. 2. D C Kulshreshtha, “Basic Electrical Engineering”, Tata McGraw Hill, 10th Edition, 2019. 3. Edward Hughes, “Electrical and Electronic Technology”, Pearson Publications, 10th Edition, 2010. 4. Rajendra Prasad, “Fundamentals of Electrical Engineering”, PHI Learning, 2nd Edition, 2009. 		

5. V.N.Mittle and A.Mittal, "Basic Electrical Engineering", Tata McGraw-Hill Education, 2005.

Course Outcomes:

After completion of the course the students will be able to,

CO1: Understand the working of Hydro –electric, Thermal and Nuclear power plants

CO2: Apply the electric circuit theorems to DC and AC (single phase and three phase) circuits to determine current, voltage, and power in various branches

CO3: Analyze the working principle and construction to identify the suitable applications of DC generators, motors and transformers by identifying the specifications

CO4: Identify the safety aspects in different types of wiring mechanisms and evaluate the energy consumption in domestic loads

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	-	-	-	-	-	-	-	-	-	-	1
CO2	3	1	1	1	-	-	-	-	-	-	-	1
CO3	3	1	1	1	-	-	-	-	-	-	-	1
CO4	3	1	1	1	-	-	-	1	-	1	-	1

22UEC114N/22UEC214N	INTRODUCTION TO ELECTRONICS ENGINEERING	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS.		SEE MARKS:50
Course Objectives		
<ol style="list-style-type: none"> 1. Understand the operation of semiconductor devices and their applications. 2. Know transistor (BJT) as an amplifier. 3. Study Op-Amps and its applications. 4. Know logic circuits and their optimization. 5. Understand the principles of transducers and communication systems. 		
UNIT - I		10 Hrs.
<p>Power Supplies –Block diagram, PN Junction Diode Characteristics, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.</p> <p>BJT Characteristics and Biasing- Common Base and Common Emitter Configurations, Voltage Divider Biasing.</p> <p>Self study component: Switched Mode Power Supply.</p>		
UNIT – II		10 Hrs.
<p>Amplifier and Oscillators – Single Stage CE Amplifier, Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multi vibrators, Single-stage a stable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations)</p> <p>Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op-amp circuits: Inverting and non-inverting amplifiers, voltage follower, summer, integrator, differentiator.</p> <p>Self study component: Op-Amp as zero crossing detector</p>		
UNIT - III		10 Hrs.
<p>Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates</p> <p>Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder, Parallel Adder</p> <p>Self study component: Half subtractor and full subtractor.</p>		
UNIT - IV		10 Hrs.
<p>Analog Communication Schemes – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, FM.</p> <p>Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques.</p> <p>Sensors and Interfacing – Instrumentation and control systems, Transducers, Sensors.</p> <p>Self study component: Opto-couplers</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. Mike Tooley, “Electronic Circuits, Fundamentals & Applications”, 4th Edition, Elsevier, 2015. 2. M. Morris Mano, “Digital Logic and Computer Design”, PHI Learning, 2008. 3. D .P .Kothari, I. J. Nagrath, “Basic Electronics”, 2nd edition, McGraw Hill Education (India), Private Limited, 2018. 		

Course Outcomes:

After completion of the course the students will be able to,

CO1: Differentiate semiconductor devices and their parameters based on V-I characteristics.

CO2: Analyze the applications of electronic devices and circuits.

CO3: Analyze logic circuits built with basic gates.

CO4: Solve numerical problems related to basic electronic circuits and systems.

CO5: Decide type of transducer, sensor and modulation for a given application.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2	-	2	2	-	-	-	-	-	-
CO2	3	2	3	-	2	1	-	-	-	-	-	-
CO3	3	2	3	-	3	-	-	-	1	-	-	-
CO4	2	1	1	-	2	1	-	-	1	-	-	1
CO5	2	1	1	-	2	1	-	-	1	-	-	1

22UCS120N/ 22UCS220N	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS:50
TOTAL HOURS: 46HRS. (26T+20 P)		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Explain the basic architecture and functionalities of a Computer 2. Apply programming constructs of C language to solve the real-world problems 3. Explore user-defined data structures like arrays and structures in implementing solutions to problems 4. Design and Develop Solutions to problems using structured programming constructs such as functions and procedures 		
UNIT – I		07 Hrs.
<p>Basic Organization of a Computer, Steps in problem solving, Algorithms and Flowcharts with examples. Overview of C: Features of C, Structure of C program, process of compiling and executing the C program.</p> <p>Constants, Variables and Data types: Introduction, Character set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables, Example programs.</p> <p>Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and Decrement operators, Conditional operator, Bitwise operators, Special operators, Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversion in expressions, Operator precedence and Associativity.</p>		
UNIT – II		06 Hrs.
<p>Managing Input and Output Operations: Formatted and Unformatted input and output statements.</p> <p>Decision making and Branching: Decision making with <i>if</i>, <i>if-else</i>, Nesting of <i>if-else</i> statements, <i>else-if</i> ladders, <i>switch</i> statement: Operator, <i>go to</i> statement.</p> <p>Decision making and Looping: <i>while</i> statement, <i>do-while</i> statement, <i>for</i> statement, jumps in loops.</p>		
UNIT – III		06 Hrs.
<p>Arrays: Introduction, One dimensional arrays, declaration and initialization of one-dimensional arrays, Two dimensional arrays, declaration and initialization of two-dimensional arrays. Operations on arrays.</p> <p>Strings: Introduction, Declaring and initializing string variables, String-handling functions, Array of String.</p>		
UNIT – IV		07 Hrs.
<p>User defined functions: Introduction, Need for user-defined functions, a multi-function program, Elements of user defined function, Definition of functions, Return values and their types, Function calls, Function declaration. Category of functions: Based on call by value, call by reference, argument and return type and recursion.</p> <p>Structures: Defining a structure, Declaring structure variables, Accessing structure members, Initialization, Arrays of structure, Structures and Functions.</p>		

Programming Exercises

Part – A

1. Write a C program that aid in evaluating return on investment of Principal amount for 3 years at 9% rate of interest using simple interest and compound interest. $SI = PTR/100$ and $CI = P[1+R/100]^t - P$.
2. C Program to find Mechanical Energy of a particle using $E = mgh + 1/2 mv^2$.
3. C Program to convert Kilometers into Meters and Centimeters.
4. Write a C Program to detect whether the nature of solutions is acidic/neutral/base by reading value of pH.
5. Write a C program to determine whether a seller has made the profit or incurred the loss and display the amount and percentage of profit or loss.
6. Write a C program to identify whether the entered character belongs to an alphabet, digit or special character.
7. Write a C program to input marks of five subjects Physics, Chemistry, Biology, Mathematics and Computer. Calculate percentage and display the grade according to following:

Percentage Grade

- More than or equal to 90% S
- Between 80% - 89.99% A
- Between 70%-79.99% B
- Between 60%-69.99% C
- Between 40%-59.99% D
- Between 35%-40% E
- Below 35% F

8. Write a C program, to check whether a person is eligible for the marriage or not.
9. Write a C program to identify the quadrant of a point, when coordinates (x, y) are given.
10. Write a C program to compute area of the following of geometric objects based on user's preference using switch case:
 - v. Circle
 - vi. Triangle
 - vii. Parallelogram
 - viii. Square

Part - B

11. Write a C program to generate multiplication table between 1 to n.
12. Write a C program to generate the prime numbers between 1 to n.
13. Write a C program to Implement Linear Search on Integers.
14. Write a C program to perform addition of 2 Matrix.
15. Sort the given set of N numbers using selection sort.
16. Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
17. Write a C program to find the value of a^n using user-defined function.
18. Write a C program to find the factorial of a number using recursive function.
19. Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
20. Write a C program to read two numbers and swap them with help of function through call by reference method.

22UEC134B/22UEC234B	INTRODUCTION TO EMBEDDED SYSTEM	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS.		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To provide knowledge of embedded systems, applications, purpose and processor architectures. 2. To provide background knowledge of communication interfaces, characteristics and quality attributes of embedded systems. 3. To study general purpose processors software and processor peripherals. 4. To impart knowledge of 8051 Microcontroller, features and its applications. 		
UNIT – I		10 Hrs.
Introduction to embedded systems, Embedded system vs. general computing system, Classifications, Purpose of embedded system, Major application areas. The typical embedded system, Microcontrollers, Microprocessors, RISC, CISC, Harvard and Von-Neumann, Big Endian, Little Endian processors.		
UNIT – II		10 Hrs.
Memory, Sensors, Actuators, Communication interface: Inter Integrated Interface, Serial Peripheral interface, UART, Parallel interface, RS232 and Bluetooth. Characteristics and quality attributes of embedded systems.		
UNIT - III		10 Hrs.
General purpose processors software: Introduction, Basic architecture, Operation, Instruction set, program and data memory space, registers, I/O, interrupts, Operating System, ASIP's, Microcontrollers, DSP, Selecting Microprocessor. Standard Single Purpose Processors peripherals: Introduction, Timers, Counters and watch dog timers, UART.		
UNIT - IV		10 Hrs.
8051 Microcontroller: Introduction, Features of 8051 Microcontroller, Block diagram, ALU, PC, ROM, RAM, Address line, Data line, Special function registers, RAM organization, Stack, Basics of Serial Communication, Interrupts, Timers and counters, Input output ports, simple pseudo code.		
Reference Books:		
<ol style="list-style-type: none"> 1. Shibu K V, "Introduction to embedded systems", Tata McGraw Hill private limited, 2010. 2. Frank Vahid, Tony Givargis, "Embedded system design: A unified hardware/software introduction", John Wiley and Sons, 2001. 3. Kenneth J Ayala, "The 8051 Microcontroller, Architecture programming and applications", West publishing company, college and school division, 1997. 4. Rajkamal, "Embedded systems: architecture, programming and design", Tata McGraw Hill private limited, second edition. 		

Course Outcomes:

After completion of the course the students will be able to,

CO1: Gain comprehensive knowledge about embedded systems, major application area of embedded systems and processor architectures.

CO2: Analyze communication interfaces, characteristics and quality attributes of embedded systems.

CO3: Identify general purpose processors software and processor peripherals necessary for embedded systems.

CO4: Explore 8051 Microcontroller capabilities and able to write pseudo codes.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	-	-	2	1	1	1	1	1	-	1
CO2	3	2	2	-	1	1	1	1	1	2	-	1
CO3	3	2	2	-	1	2	1	1	2	1	-	2
CO4	3	2	2	-	1	2	1	1	2	1	-	2

22UEC135B/22UEC235B	INTRODUCTION TO COMMUNICATION TECHNOLOGY	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS.		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Know the fundamentals of different communication systems. 2. Understand modern communication techniques and their utility in modern cellular communication systems. 3. Know the design principles of cellular communication systems. 4. Understand the different communication standards. 		
UNIT – I		10 Hrs.
<p>Introduction to communication systems: Elements of communication systems, Need for modulation, Electromagnetic spectrum and applications, Terminologies in communication systems</p> <p>Introduction to wireless .communication systems: Evolution of mobile radio communication, Beginning of Radio, Wireless mobile communication, Applications of wireless communication, Disadvantages of wireless communication systems, Examples of wireless communication systems, Difference between fixed telephone network and wireless telephone network, Development of wireless communication, Fixed network transmission hierarchy, Comparison of wireless communication systems.</p>		
UNIT – II		10 Hrs.
<p>Modern communication systems: Introduction, First generation (1G), Second generation (2G), Generation (2.5G), Third generation (3G), Evolution from 2G to 3Gt, Fourth generation (4G), Digital cellular parameters, Differences between analog cellular and digital cellular systems, wireless local loop (WLL), wireless local area networks (WLANs), Personal Area Networks (PANs), Bluetooth</p> <p>Introduction to cellular mobile systems: Introduction, Spectrum allocation, International telecommunication union (ITU), Wireless communication system, Basic components of cellular systems, Cellular system architecture, GSM: Most popular cellular system, type of channels, Cell concept in wireless communication, shape selection of the cell.</p>		
UNIT – III		10 Hrs.
<p>Cellular system design fundamentals: Introduction, Frequency reuse, Cellular capacity increasing parameters, channel assignment strategies, Hand-off strategies, Hands-off Initiation, Type of hands-off on the basis of decision making process, channel assignment strategies for hands-off, Interference, Trunking, Grade of service.</p>		
UNIT – IV		10 Hrs.
<p>Multiple access techniques for wireless communication: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Advanced TDMA, Multipath interference, Comparison between TDMA & FDMA, Space Division Multiple Access (SDMA), Spread spectrum, types of spread spectrum, Code Division Multiple Access (CDMA)</p> <p>Radio wave propagation: Introduction, Doppler shift, parameters of multipath channels, fading, diversity techniques, free space propagation model, Phenomenon of propagation, Propagation Models.</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. George Kennedy, Bernard Davis, S R M Prasanna, “Electronic Communication Systems”, Tata McGraw Hill Education Private Limited, New Delhi, 5th Edition. 2. Rajeshwar Dass, “Wireless Communication Systems”, I. K. international Publishing House Pvt. Ltd., New Delhi. 		

Course Outcomes:

After completion of this course the students are able to,

CO1: Analyze different communication systems with respect to operation and utility.

CO2: Choose suitable modulation technique for cellular mobile systems.

CO3: Decide specific channel multiple access techniques for a communication application.

CO4: Choose specific communication standards for a given communication application.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	1	1	1	1	1	1	-	1
CO2	3	2	2	-	1	1	1	1	1	2	-	1
CO3	3	2	2	-	1	2	1	1	2	1	-	2
CO4	3	2	2	-	1	2	1	1	2	1	-	2

22UEE136B/22UEE236B	RENEWABLE ENERGY SOURCES	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS.		SEE MARKS: 50
Course Objectives: <ol style="list-style-type: none"> 1. To identify the parameters required for solar, wind, biomass, geothermal and ocean energy conversion systems. 2. To apply and analyze concepts and theory related to solar, wind, biomass, geothermal and ocean energy conversion systems. 3. To derive power output of solar and wind energy conversion systems based on the corresponding solar irradiation and wind speed respectively. 4. To analyze pros and cons of solar, wind, biomass, geothermal and ocean energy conversion systems. 		
UNIT – I		10 Hrs.
Introduction to Energy Sources: Classification of energy resources, conventional energy resources–availability and their limitations; non-conventional energy resources–classification, advantages, limitations; comparison of conventional and non-conventional energy resources.		
Solar Energy Basics: Introduction, solar constant, basic sun-earth angles – definitions and their representation; solar radiation geometry, solar radiation data measuring instruments–Pyranometer and Pyrhelimeter.		
UNIT – II		10 Hrs.
Solar Thermal Systems: Principle of conversion of solar radiation into heat, solar water heaters (Flat plate collectors); solar cookers – box type, concentrating dish type; solar driers, solar still.		
Solar Electric Systems: Solar thermal electric power generation – solar pond and concentrating solar collector (parabolic trough, parabolic dish, central tower collector), advantages and disadvantages; solar photovoltaic – solar cell fundamentals, module, panel and array; solar PV systems – street lighting, domestic lighting and solar water pumping systems.		
UNIT – III		10 Hrs.
Wind Energy: Wind and its properties, history of wind energy, basic principles of Wind Energy Conversion Systems (WECS), wind data measuring instrument, classification of WECS, parts of a WECS, power in the wind; Vertical axis wind turbine generator - Savinuous and Darrius types, advantages and limitations of WECS.		
Biomass Energy: Introduction, photosynthesis process, biomass conversion technologies, biomass gasification – principle and working of gasifiers; biogas - production of biogas, factors affecting biogas generation; types of biogas plants–KVIC and Janata model.		
UNIT – IV		10 Hrs.
Geothermal Energy: Introduction, classification, conversion technologies, applications, advantages and limitations of geothermal resources.		
Energy from Ocean: Principle of tidal power, components of Tidal Power Plant (TPP), classification, advantages and limitations of TPP.		
Ocean Thermal Energy Conversion (OTEC): Principle of OTEC system, types of OTEC power generation, block diagram, applications, advantages and limitations.		

Reference Books:

1. B. H. Khan, "Conventional Energy Resources", Tata McGraw-Hill Education Private Limited, New Delhi, 3rd Edition, 2007.
2. G. D. Rai, "Non-conventional Energy sources", Khanna Publication, 4th Edition, 2015.
3. G. N. Tiwari and M K. Ghosal, "Fundamentals of Renewable Energy Resources", Alpha Science International Ltd, 1st Edition, 2007.
4. Shobh Nath Singh, "Non-Conventional Energy Resources", Pearson Education, 2nd Edition 2018.
5. Bent Sorensen, "Renewable Energy", Academic Press, 5th Edition, 2017 (e-book).
6. David Buchla, Thomas Kissell and Thomas Floyd, "Renewable Energy Systems", Pearson, 1st Edition, 2014 (e-book).
7. Roland Wengenmayr, Thomas Buhrke, "Renewable Energy: Sustainable Energy Concepts for the Future", Wiley-VCH, 2nd Edition, 2008 (e-book).

Course Outcomes:

After completion of the course the students will be able to,

CO1: Identify electrical and mechanical devices of solar, wind, biomass, geothermal and ocean Energy conversion systems.

CO2: Measure performance parameters related to solar, wind, biomass, geothermal and ocean energy conversion systems.

CO3: Compute the power generation of wind and solar energy correspond to variable data.

CO4: Compare the features of solar, wind, biomass, geothermal and ocean energy conversion systems.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	-	1	1	1	-	1	1	1
CO2	3	1	1	1	-	1	1	1	-	1	-	1
CO3	3	2	3	1	-	-	-	-	-	-	1	1
CO4	3	3	3	2	-	-	-	1	-	-	-	1

22UCV138B/22UCV238B	GREEN BUILDINGS	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS.		SEE MARKS:50
Course Objectives: <ol style="list-style-type: none"> 1. Understand the Definition, Concept & Objectives of the terms cost effective construction and green building. 2. Apply cost effective techniques in construction 3. Apply cost effective Technologies and Methods in Construction 4. Understand the Problems due to Global Warming 5. State the Concept of Green Buildings 6. Understand Green Buildings 		
UNIT – I		10 Hrs.
Introduction to the concept of cost effective construction Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo-Availability of different materials- Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials		
UNIT – II		10 Hrs.
Environment friendly and cost effective Building Technologies Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro-Cement and Ferro-Concrete constructions – different pre-cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies - Costford - Nirmithi Kendra – Habitat.		
Global Warming Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.		
UNIT - III		10 Hrs.
Green Building rating Systems BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Life cycle design of Materials and Structures (Concepts only)		
UNIT - IV		10 Hrs.
Utility of Solar Energy in Buildings Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.		
Green Composites for Buildings Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment		

Reference Books::

1. K. S Jagadish, B. V. Venkataramana Reddy, K. N Nanjundarao "Alternative Building Materials and Technologies", New Age International Publishers.
2. G Harihara Iyer, "Green Building Fundamentals", Notion Press.
3. Dr. Adv. Harshul Savla, "Green Building: Principles & Practices", Notion Press.

Course Outcomes::

After completion of the course the students will be able to,

CO1: Select different building materials for cost effective construction

CO2: Apply effective environmental friendly building technology to reduce global warming

CO3: Analyse buildings for green rating systems.

CO4: Use alternate source of energy and effective use of water.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	-	-	-	1	1	-	-	-	-	-
CO2	2	1	-	-	-	1	1	-	-	-	-	-
CO3	2	1	-	-	-	1	1	-	-	-	-	-
CO4	2	1	-	-	-	1	1	-	-	-	-	-

22UCV139B/22UCV239B	WASTE MANAGEMENT	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS.		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. To learn broader understandings on various aspects of solid waste management. 2. To learn collection, storage, transport, processing, and disposal of waste. 3. To learn identification, management and treatment of hazardous waste. 		
UNIT – I		10 Hrs.
INTRODUCTION TO SOLID WASTE MANAGEMENT		
Classification of solid wastes (source and type based), Solid Waste Management (SWM), elements of SWM, (ESSWM) Environmentally Sound Solid Waste Management and (EST) Environmentally Sound Technologies, factors affecting SWM, Indian scenario, progress in (MSW) Municipal Solid Waste management in India.		
UNIT – II		10 Hrs.
WASTE GENERATION ASPECTS		
Waste Stream Assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions.		
UNIT – III		10 Hrs.
COLLECTION, STORAGE, TRANSPORT, PROCESSING TECHNIQUES AND DISPOSAL OF WASTES		
Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping, control, inventory and monitoring, implementing collection and transfer system, a case study. Waste Disposal: key issues in waste disposal, disposal options and selection criteria, sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues. Waste Processing Techniques: Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering.		
UNIT – IV		10 Hrs.
SOURCE REDUCTION, REUSE, PRODUCT RECOVERY & RECYCLING		
Refuse, Source Reduction, Reuse, Product Recovery and Recycling (SR's): basics, purpose, implementation monitoring and evaluation of source reduction, reuse, significance of recycling, planning of a recycling programme, recycling programme elements, commonly recycled materials and processes, recovery of waste materials, a case study.		
HAZARDOUS WASTE MANAGEMENT AND TREATMENT		
Identification and classification of hazardous waste, hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India.		
Reference Books:		
<ol style="list-style-type: none"> 1. Tchobanoglous, G., Theisen, H., and Samuel A Vigil, "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993. 2. Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H., "Waste Management", Springer, 1994. 3. White, F. R., Franke P. R. & Hindle M., "Integrated solid waste management: a life cycle inventory", Mc Dougall, P. John Wiley & Sons, 2001. 4. Nicholas, P., & Cheremisinoff, P. D., "Handbook of solid waste management and waste minimization technologies", Imprint of Elsevier Science, 2005. 		

Course Outcomes:

CO1: Apply the basics of solid waste management towards sustainable development

CO2: Study the composition and characteristics of the waste and its affect on the environment

CO3: Apply technologies to process waste and dispose the same.

CO4: Study the 5Rs, management and treatment of the hazardous waste.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	-	-	-	-	1	3	-	-	-	-	-
CO2	3	1	-	-	-	3	2	-	2	-	-	1
CO3	3	1	-	-	2	2	3	-	-	-	1	1
CO4	3	-	-	-	-	3	2	-	-	-	1	2

22UCS140B/22UCS240B	INTRODUCTION TO INTERNET OF THINGS (IoT)	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS.		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics. Understand the recent application domains of IoT in everyday life. Gain insights about the current trends of associated IOT technologies and IOT Analytics. 		
UNIT - I		10 Hrs.
Basics of Networking: Introduction, Network Types, Layered network models Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components		
UNIT – II		10 Hrs.
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.		
UNIT - III		10 Hrs.
Associated IoT Technologies Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. IoT Case Studies Agricultural IoT – Introduction and Case Studies		
UNIT - IV		10 Hrs.
IoT Case Studies and Future Trends Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction		
Reference Books:		
<ol style="list-style-type: none"> Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press, 2021. S. Misra, C. Roy, and A. Mukherjee, "Introduction to Industrial Internet of things and industry 4.0". CRC Press, 2020. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, A press Publications, 2013. 		
Course Outcomes:		
After completion of the course the students will be able to, CO1: Describe the evolution of IoT, IoT networking components and addressing strategies in IoT. CO2: Classify various sensing devices and actuator types. CO3: Demonstrate the processing in IoT. CO4: Explain associated IoT Technologies. CO5: Illustrate the architectures of IoT application.		

22UCS141B/22UCS241B	INTRODUCTION TO CYBER SECURITY	CREDITS: 03
L:T:P: 3:0:0		CIE Marks:50
TOTAL HOURS: 40HRS.		SEE Marks:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To familiarize cybercrime terminologies and perspectives 2. To understand Cyber Offenses and Botnets 3. To gain knowledge on tools and methods used in cybercrimes 4. To understand phishing and computer forensics 		
UNIT – I		10 Hrs.
Introduction to Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws.		
UNIT – II		10 Hrs.
How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercafe & cybercrimes. Botnets: The fuel for cybercrime, Attack Vector. Tools and Methods used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key Loggers and Spywares		
UNIT – III		10 Hrs.
Different Forms of attacks in Cybercrime: Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attackers, Attacks on Wireless networks. Phishing and Identity Theft: Introduction, phishing, methods of phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft		
UNIT – IV		10 Hrs.
Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.		
Reference Books:		
<ol style="list-style-type: none"> 1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt. Ltd, First Edition, 2011. 2. Rajkumar Singh Rathore, Mayank Bhushan, "Fundamentals of Cyber Security", BPB; First Edition, 2017. 3. Anand Shinde, "Introduction to Cyber Security", Notion Press, First Edition, 2020. 4. Nilakshi Jain and Dhananjay R. Kalbande, "Cyber Security and Cyber Laws", Wiley India Pvt. Ltd., 2020. 		
Course Outcomes:		
<p>After completion of the course the students will be able to,</p> <p>CO1: Explain the cybercrime terminologies and laws.</p> <p>CO2: Illustrate tools and methods used on Cybercrime</p> <p>CO3: Describe the different forms of attacks, Phishing and Identity Theft</p> <p>CO4: Comprehend cyber offences and Botnets</p> <p>CO5: Justify the need of computer forensics</p>		

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	-	-	-	-	-	-	2	-	-	-	-
CO2	-	2	-	3	3	-	-	-	-	-	-	-
CO3	-	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	2

22UME142B/22UME242B	COMPOSITE MATERIALS	CREDITS: 03
L:T:P: 3:0:0		CIEMARKS:50
TOTAL HOURS: 40HRS.		SEEMARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Explain the behavior of constituents in the composite materials 2. Enlighten the students in different types of reinforcement 3. Develop the student's skills in understanding the different manufacturing methods available for composite material. 4. Illuminate the knowledge of macro mechanical analysis and cutting and joining of the composite materials 		
UNIT-I		10 Hrs.
Introduction to composite materials		
<p>Definition and classification of composites based on matrix and reinforcement, Characteristics of composite materials, Fibrous composites, Laminate composites and particulate composites.</p> <p>Factors which determine the properties of composites, Benefits of composites, properties and types of reinforcements and matrices, Reinforcement-matrix interface.</p>		
UNIT-II		10 Hrs.
Polymer matrix composites		
<p>Introduction, Polymer matrices, Processing methods like Layup and curing, open and closed mold process- hand layup techniques, laminate bag molding.</p> <p>Production procedures for bag molding, filament winding, pultrusion, pulforming, thermo-forming, molding methods, properties of PMCs and applications, Some commercial PMCs.</p>		
UNIT-III		10 Hrs.
Metal matrix composites		
<p>Introduction, Metallic matrices, Classification of MMCs, Need for production of MMCs, Interface reactions, processing methods like Powder metallurgy, diffusion bonding.</p> <p>Melt stirring, Compo/Rheo casting, Squeeze casting, Liquid melt infiltration, Spray deposition and In situ Processes, Properties of metal matrix composites, Applications, Some commercial MMCs.</p>		
UNIT-IV		10 Hrs.
Cutting, Machining and Joining of Composites		
<p>Continuous fibers, Iso-stress condition, Iso-strain condition, critical volume fraction of fiber and minimum volume fraction of fiber, Numericals on modulus of rigidity, and mechanics of discontinuous fibers.</p> <p>Cutting and machining of composites: Reciprocating knife cutting, cutting of cured composite, Joining of composites: Mechanical fastening, Adhesive bonding.</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. K. K. Chawla, "Composite Science and Engineering", , Springer Verlag, 1998. 2. Hull and Clyne, "Introduction to composite materials" Cambridge University Press, 2nd Edition, 1990. 3. F. L. Mathew and R. D. Rawlings, Composite Materials: Engineering and Science Woodhead Publishing Limited, 1999. 4. MeingSchwaitz, "Composite materials handbook", McGraw Hill Book Company, 1984. 5. Robert M. Jones, "Mechanics of Composite Materials", McGraw Hill Kogakusha Ltd, 1998. 6. S. C. Sharma, "Composite materials", Narosa Publishing House, 2000. 7. ArtarKaw, "Mechanics of composites", CEC Press, 2002. 		

Course Outcomes:

After completion of the course student will be able to

CO1: Solve the numerical problems on modulus of elasticity of the FRP composites.

CO2: Analyse the critical volume fraction of fibres in the FRP composites.

CO3: Synthesize polymer matrix and metal matrix composites.

CO4: Use the abrasive water jet machining of composites.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	1	-	-	-	-	-	-	1	-	1
CO2	1	2	1	-	-	-	-	-	-	1	-	1
CO3	-	1	1	2	-	-	-	-	-	1	-	1
CO4	-	-	1	1	2	-	-	-	-	1	-	1

21UME143B/21UME243B	INTRODUCTIONS TO ROBOTICS	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS: 50
TOTAL HOURS: 40HRS.		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. Understand robot configuration, structures, basic components, workspace and generations of robots. 2. Get acquainted with performing spatial transformations and solve kinematics of the robot. 3. Learn about various sensors, actuators, robot programming. 4. Understand the present & future applications of a robot. 		
UNIT - I		10 Hrs.
Robot Basics		
Robot-Basic concepts, Need, Law, History, Anatomy, specifications. Robot configurations- cartesian, cylinder, polar and articulate. Robot wrist mechanism, Precision and accuracy of robot.		
Robot Elements		
End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation		
UNIT – II		10 Hrs.
Robot Kinematics and Control		
Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation.		
Control of robot manipulators – Point to point, Continuous Path Control, Robot programming		
UNIT – III		10 Hrs.
Robot Sensors		
Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors, Introduction to Machine Vision and Artificial Intelligence.		
UNIT – IV		10 Hrs.
Robot Applications		
Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management. Applications, Micro and Nano-robots, Future Applications.		
Reference Books:		
<ol style="list-style-type: none"> 1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, “Industrial Robotics Technology, Programming and Applications”, Tata –McGraw Hill Pub. Co., 2008. 2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010. 3. Klafter.R.D, Chmielewski.T.A, and Noggin’s., “Robot Engineering: An Integrated Approach”, Prentice Hall of India Pvt. Ltd., 1994. 4. Fu.K.S, Gonzalez.R.C & Lee.C.S.G, “Robotics control, sensing, vision and intelligence”, Tata-McGraw Hill Pub. Co., 2008 5. Yu. “Industrial Robotics”, MIR Publishers Moscow, 1985. 		
Course Outcomes:		
After completion of the course student will be able to		
CO1: Comprehend the basic elements of industrial robots		
CO2: Analyse robot kinematics and its control methods.		
CO3: Classify the various sensors used in robots for better performance.		
CO4: Summarize various industrial and non-industrial applications of robots.		

Course Outcomes:	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	1	-	-	-	-	1	-	1	-	-
CO2	1	2	1	-	-	-	-	1	-	1	-	-
CO3	-	1	1	2	-	-	-	1	-	1	-	-
CO4	-	-	1	1	2	-	-	1	-	1	-	-

22UBT148B/22UBT248B	BIOMASS AND BIOENERGY	CREDITS: 03
L:T:P: 3:0:0		CIE MARKS:50
TOTAL HOURS: 40HRS.		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. To understand the basic concepts of biomass and bioenergy. 2. To gain the knowledge about different biomass conversion technologies. 3. To know about innovative bioenergy plants and bio refinery concept. 		
UNIT - I		10 Hrs.
Biomass		
<p>Definition, constituents and energy properties. Biomass as an energy core and its different mode of utilization. Biomass typologies: lignocellulosic, starchy, sugary, oilseeds, MSW, sewage sludge.</p> <p>Introduction to Biofuels - definition (liquid -biodiesel, bioethanol; gaseous -syngas, biogas; solid - charcoal and biochar), advantages and disadvantages. Biofuel life cycle. Conventional fuels and their environmental impacts. Renewable energy sources. Modern fuels and their environmental impacts.</p>		
UNIT – II		10 Hrs.
Types of Bioenergies:		
<p>First generation, Second generation, third generation and next/future generation fuels Biomass Conversions Technologies:</p> <p>Physical conversion: Dewatering, drying, size reduction, steam explosion, densification, pelleting, chipping, oil extraction.</p> <p>Thermochemical conversion: Oil trans-esterification</p> <p>Chemical conversion: Lignocellulosic conversion (2G technology)</p> <p>Biochemical conversion: Anaerobic digestion (biogas production from organic waste and Waste water), CBG. Fermentation (bioethanol production)</p>		
UNIT - III		10 Hrs.
Thermal conversion:		
<p>Combustion plants for heat generation: wood and pellet burning stoves; wood, pellet and wood chips boiler. Gasification plants, Pyrolysis plants.</p> <p>Innovative bioenergy plants: biomass to synthetic natural gas; biomass to liquid biofuels through Fisher-Tropsch; absorption enhanced reforming. Hydrothermal processes: carbonization, Liquefaction, gasification.</p>		
UNIT - IV		10 Hrs.
Bio-Energy and Bio-Refinery		
<p>Overview of Integrated biorefinery concept, value-added processing of bioenergy residues. Economic feasibility of producing bioenergy (with one example), Issues with bioenergy production & use. Impact of bioenergy in global climate change & food production. Strategies for new vehicle technologies. Current research on biomass & bioenergy production. Market barriers of bioenergy.</p>		
Reference Books:		
<ol style="list-style-type: none"> 1. Samir K. Khanal, Anaerobic Biotechnology for Bioenergy Production: Principles and Applications. Wiley-Blackwell Publishing, 2008. 2. E.J. Dasilva, C Ratledge & A Sasson, Biotechnology, Economic & Social Aspects; Cambridge Univ. Press, Cambridge, 2000. 3. Pradipta Kumar Mahopatra, Environmental Biotechnology 2007. 4. Caye M. Drapcho, Nghiem Phu Nhuan, Terry H. Walker, Biofuel Engineering Process technology Mc Grow Hill company, 2008. 5. Dominik Rutz & Rainer Janssen, Biofuel Technology Handbook 2008. 		

Course Outcomes:

After completion of the course student will be able to

CO1: Emphasize on the basic aspects of Biomass and Bio-Energy.

CO2: Interpret and describe biomass conversion technologies.

CO3: Acquire knowledge of innovative bioenergy plants.

CO4: Interpret and describe of Bio-Refinery concept.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	2	-	-	-	3	-	-	-	-	2
CO2	1	3	3	2	3	1	3	-	-	-	-	1
CO3	1	1	3	2	3	1	3	-	-	-	-	1
CO4	1	-	2	-	2	1	2	-	-	-	-	2

22UCS130B/22UCS230B	INTRODUCTION TO WEB PROGRAMMING (INTEGRATED)	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS:50
TOTAL HOURS: 46HRS. (26T+20P)		SEE MARKS:50

Course objectives

1. To use the syntax and semantics of HTML and XHTML
2. To develop different parts of a web page
3. To understand how CSS can enhance the design of a webpage.
4. To create and apply CSS styling to a webpage

UNIT-I	08 Hrs..
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Fundamentals of WEB: Introduction to Internet, World Wide Web, Web Browsers, Web Servers, Uniform Resource-Locators, MIME, HTTP. Traditional HTML and XHTML: First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: Document Type Statements and Language Versions, (X) HTML Document Structure, Browsers and (X) HTML, The Rules of (X) HTML, Major Themes of (X) HTML.

UNIT-II	06 Hrs..
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HTML5: Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics: HTML5's Open Media Effort, HTML5 Form Changes.

UNIT-III	06 Hrs..
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Cascading Style Sheets (CSS): Introduction, CSS Overview , CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, , Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property .

UNIT-IV	06 Hrs..
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Tables and CSS, Links and Images: Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo- Class Selectors, thead and tbody Elements, Cell Spanning. CSS display Property with Table Values, **Links and Images:** a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG.

Reference Books *

1. Thomas A. Powell, **The Complete Reference HTML & CSS** (Fifth Edition), Tata McGraw Hill.
2. John Dean, **WEB PROGRAMMING with HTML5 CSS and JavaScript** (First Edition), Jones & Bartlett Learning.
3. Chris Bates, **WEB PROGRAMMING** (Second Edition), Wiley.

Programming Assignments:

1. To create a simple html file to demonstrate the use of different tags.
Create an html page named as "Basic_Html_Tags.html" and add the following tags
 - a) Different heading tags (h1 to h6)
 - b) Paragraph

- c) Horizontal line
- d) Line Break
- e) Pre tag
- f) Different Logical Style (,<u>,<Sup>,<sub>)

2. Create a HTML code to display the following web page using list.

Learning Web Development

- I. Background Skills
 - A. Unix Commands
 - B. Vim Text Editor
- II. HTML
 - A. Minimal Page
 - B. Headings
 - C. Tags
 - D. Lists
 - i. Unordered
 - ii. Ordered
 - iii. Definition
 - iv. Nested
 - E. Links
 - i. Absolute
 - ii. Relative
 - F. Images

3. Create an html page named as "Table.html" to display the following table.

NAME	SUBJECT	MARKS
Hillary	Advanced Web	75
	Operating Syatem	60
Lary	Advanced Web	80
	Operating Syatem	75
Total Average:		72.5

- 8. Create an internal style sheet to define the following CSS properties for element(s) on your page:
 - a. text-decoration
 - b. text-align
 - c. font-size
 - d. font-family
 - e. font-weight

- 9. Create an external style sheet to define the following CSS properties for element(s) on your page:
 - a. background-color
 - b. color
 - c. margin-xxx (left, right, top, or bottom)
 - d. padding
 - e. border-style , border-color , border-width

- 10. To create HTML code to insert image and to add a link to a web page.

- 11. Write a HTML code to perform the following CSS properties
 - a. Text Properties
 - text-color
 - text-align
 - text-decoration
 - text-transformation
 - b. Font Properties
 - font-style
 - font-size

22UCS131B/22UCS231B	INTRODUCTION TO PYTHON PROGRAMMING	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS: 50
TOTAL HOURS: 46HRS. (26T+20P)		SEE MARKS: 50
Course objectives		
<ol style="list-style-type: none"> 1. Learn the syntax and semantics of the python programming languages 2. Illustrate the process of structuring the data using list, tuples, string and dictionaries 3. Demonstrate the use of built-in function to navigate the file system 		
UNIT – I		07 Hrs.
Python Basics		
Our first python script, Comments, Basic data types, Identifiers, Keywords, variables, basic input and output: printing using the print function, Taking input using the input function		
Python control structures:		
Getting started with programs, decisions, loops, terminating control		
UNIT – II		06 Hrs.
Lists:		
Creating lists, Accessing list elements, counting list elements, Iterating through list elements, searching elements within lists, list slices, adding and deleting elements, adding multiplying and copying lists, simple programs on lists, nested lists		
Tuples: Creating Tuples, accessing tuple elements, counting tuple elements, Iterating through tuple elements, searching elements within tuples, tuple slices, adding multiplying and copying tuples, comparison of tuples and lists, simple programs		
Introduction to sets: Creating sets, Accessing set elements, Iterating through set elements		
UNIT – III		06 Hrs.
Strings:		
Conversion from and to strings, searching in strings, splitting strings, joining strings, modifying strings, padding strings		
Dictionaries:		
Creating Dictionaries, accessing Dictionary elements, counting Dictionary elements, Iterating through Dictionary elements, searching elements within Dictionaries, adding and deleting Dictionary, comparison simple programs		
UNIT – IV		07 Hrs.
Functions:		
Introduction to functions, function definitions, function call, positional arguments, default arguments, keyword arguments, variable arguments, returning from functions,		
Files:		
Introduction to file handling, opening and closing files, reading from text files, writing to text files, seeking within files, reading to binary files, writing to binary files		
Programming Exercises:		
<ol style="list-style-type: none"> 1. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages. 2. Develop a program to read the name and year of birth of a person. Display whether the 		

person is a senior citizen or not.

3. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
4. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
5. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
6. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
7. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use
8. Dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]
9. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip (), len (), list methods sort (), append (), and file methods open (), read lines (), and write ()].
10. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
11. Write a function named DivExp which takes TWO parameters a, b and returns a value c ($c=a/b$). Write suitable assertion for $a>0$ in function DivExp and raise an exception for when $b=0$. Develop a suitable program which reads two values from the console and calls a function DivExp.
12. Write python program to implement simple library system using dictionary: Library = { ISBN1 : [No of copies, title, author] . . . } to support i) add new book ii) issue book iii) Return book operations
13. Given price list: {item1: amt, item2: amt . . .} and list of items purchased, write python program to find amount to be paid for purchased items.
14. Ex: pricelist ; { "pen":10, "Notebook":50, "book":100} Items_purchased = ["pen", "book"]
15. o/p: amt_to_be_paid = 110

Reference Books:

1. B. Nagesh Rao, "Learning Python", Cyberplus publication, 2nd edition
2. Gaowrishankar S., Veena A, "Introduction to python programming", CRC press
3. Al Sweigart, "Automate the boring stuff with Python", No Starch press, 1st Edition, 2015.
4. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Green Tea Press, 2nd Edition, 2015.

Course Outcomes:

After completion of the course the students will be able to:

CO 1: Explain the syntax and semantics of different statements and functions.

CO 2: Demonstrate the use of strings, files, lists, tuples, dictionaries and exceptions

CO 3: Develop the solution to a given problem by selecting appropriate data types and modules

CO 4: Able to create, read data from and write data to files

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	1	-	-	-	-	-	-	2
CO3	-	3	3	1	2	-	-	-	-	-	-	2
CO4	-	3	3	1	2	-	-	-	-	-	-	2

22UCS132B /22UCS232B	BASICS OF JAVA PROGRAMMING	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS: 50
TOTAL HOURS: 46HRS. (26 T+20 P)		SEE MARKS: 50
Course Objectives:		
<ol style="list-style-type: none"> 1. Learn fundamental features of object oriented language and JAVA 2. Set up Java JDK environment to create, debug and run simple Java programs. 3. Learn object oriented concepts using programming examples. 4. Study the concepts of importing of packages and exception handling mechanism. 		
UNIT – I		07 Hrs.
An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings		
UNIT – II		06 Hrs.
Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The? Operator, Operator Precedence, Using Parentheses, Control Statements: Java`s Selection Statements, Iteration Statements, Jump Statements.		
UNIT – III		06 Hrs.
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited.		
UNIT – IV		07 Hrs.
Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class. Text book 1: Ch 8.		
Reference Books:		
<ol style="list-style-type: none"> 1. Herbert Schildt, Java the Complete Reference, 7th Edition, Tata McGraw Hill, 2007. <p style="margin-left: 40px;">Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> ● https://onlinecourses.nptel.ac.in/noc22_cs47/preview 		
Programming Exercises		
<ol style="list-style-type: none"> 1. Develop simple java programs to demonstrate the use of conditional statements 2. Develop simple java programs to demonstrate the use <ol style="list-style-type: none"> a. loop statements b. Reading & printing different data types in java 3. Develop simple java programs on arrays(single & multidimensional) & recursion 4. Develop simple java programs to demonstrate Interfaces concept 5. Develop simple java programs to demonstrate Polymorphism mechanisms 6. Develop simple java programs to demonstrate Inheritance concept 7. Develop simple java programs to demonstrate Package concept 8. Develop simple java programs to demonstrate exception handling 9. Develop simple java programs to demonstrate use of Constructors 		

22UCS133B /22UCS233B	INTRODUCTION TO C++ PROGRAMMING	CREDITS: 03
L:T:P: 2:0:2		CIE MARKS:50
TOTAL HOURS: 46HRS. (28T+20P)		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> 1. Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object. 2. Understand the concept of structure and functions 3. Understand the capability of a class to relay upon another class and functions. 4. Understand about constructors which are special type of functions. 5. Understand the concept of polymorphism and inheritance. 		
UNIT – I		08 Hrs.
Introduction: Features of object oriented programming, C++ and C , C++ overview, Layout of C++ Program, Cin and Cout statements, Preprocessor directives, Comments, Manipulators, Data types, variables, constants, Arithmetical operators, Logical operators, Relational operators, Conditional operators, Loops and Decisions: for- loop, while loop, do-while loop, if statement, if-else statement, else-if statement, switch statement.		
UNIT – II		06 Hrs.
Structures: A simple structure, defining a structure, defining structure variables, accessing structure members, Functions: Simple functions, passing arguments to functions, returning value to a function, overloaded functions.		
UNIT – III		06 Hrs.
Class and Objects: Class specification, Access Specifiers, Defining Member Function, Objects Declaration, Accessing Data members and Member Function, Constructors, parameterized constructor, Destructors.		
UNIT – IV		08 Hrs.
Inheritance& Polymorphism: Derived class Constructors, destructors-Types o inheritance-Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance.		
Reference Books:		
<ol style="list-style-type: none"> 1. Robert Lafore, “Object Oriented Programming in Turbo C++”, Galgotia Publishing 2. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt.Ltd , Fourth Edition 2010. <p>Web links and Video Lectures (e-Resources): Basics of C++ - https://www.youtube.com/watch?v=BCIS40yzsSA Functions of C++ - https://www.youtube.com/watch?v=p8ehAjZWjPw Tutorial Link: https://www.w3schools.com/cpp/cpp_intro.asp https://www.edx.org/course/introduction-to-c-</p>		
Programming Assignments		
<ol style="list-style-type: none"> 1. Write a C++program to find the sum of all the natural numbers from 1to n. <ol style="list-style-type: none"> a. Write a C++ program to find the factorial of a given number b. Write a C++ program to find the given number is prime or not 2. Write a C++ program to make a simple calculator. 3. Write a C++ program to declare Strut. initialize and display contents of member variables 4. Write a C++program to demonstrate function overloading for the following prototypes.Add (int a, int b) Add (double a , double b) 5. Write a C++ program to find Area of square, rectangle ,circle and triangle using Function Overloading 6. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. 		

22UHS224C	PROFESSIONAL WRITING SKILLS IN ENGLISH	CREDIT: 01
L:T:P: 1:0:0		CIE MARKS:50
TOTAL HOURS:15HRS.		SEE MARKS:50
Course Objectives:		
<ol style="list-style-type: none"> To identify the Common Errors in Writing and Speaking of English. To achieve better Technical writing and Presentation skills for employment. To read and write technical proposals properly and make them to write good technical reports. To acquire Employment and Workplace communication skills. To learn about Techniques of Information Transfer through presentation in different level. 		
UNIT - I		3 Hrs.
Identifying Common Error in Writing and Speaking of English: Common error identification in parts of speech, Use of verbs and Phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement. Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types –Words often Confused, Misplaced modifiers, Contractions, Collocations, Word Order.		
UNIT – II		4 Hrs.
Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion in a paragraph. Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indianism in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercises. Importance of Summarizing and Paraphrasing.		
Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises.		
UNIT - III		4 Hrs.
Technical Reading and Writing Practices: Introduction, Effective Technical Reading and Writing, Technical Reports and proposal writing-Introduction, types, types of technical proposals. Effective reading and writing of technical reports and proposals. Scientific Writing & It's Process. The Listening Comprehension, Types of Listening, Barriers of listening, Improving Listening Skills. Attribute of a good and poor listener. Reading Skills and Reading Comprehension, Active and Passive Reading.		
UNIT - IV		4 Hrs.
Professional Communication for Employment: Preparation of Job Application, Components of Letter Writing, Formats and Types of official employment Business Letters, Resume. Types of Resume. Resume vs Bio Data, Profile & CV. Writing effective resume for employment, Model Letter of Application, Cover Letter with Resume, Emails, Blog Writing, Memos. Presentation skills and Formal Presentations by Students.		
Professional Communication at Workplace: Group Discussion – Importance, Characteristics, Strategies of Group Discussions. Employment/ Job Interviews. Non-Verbal Communication Skills.		

22UHS226C	SAMSKRUTHIKA KANNADA	CREDITS:01
L:T:P: 1:0:0		CIE MARKS:50
TOTAL HOURS:15HRS.		SEE MARKS:50
<p>ಕೋರ್ಸ್ ಉದ್ದೇಶಗಳು :</p> <ol style="list-style-type: none"> 1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ' ಪಠ್ಯದ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ನಾಡು, ನುಡಿ, ಭಾಷೆ, ಮತ್ತು ಕನ್ನಡಿಗರ ಸಾಂಸ್ಕೃತಿಕ ಬದುಕಿನ ಬಗೆಗೆ ಅರಿವು ಮೂಡಿಸುವುದು. 2. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆ ಹಾಗೂ ಅದಕ್ಕೆ ಪೂರಕವಾಗಿರುವ ಕನ್ನಡ ವ್ಯಾಕರಣಾಂಶಗಳ ಬಗೆಗೆ ಅರಿವು ಮೂಡಿಸುವುದು. ಪ್ರಾದೇಶಿಕ ಭಾಷೆಯಲ್ಲಿ ಅರ್ಜಿ ಮತ್ತು ಪತ್ರವ್ಯವಹಾರಗಳನ್ನು ಸಮರ್ಥವಾಗಿ ನಿರ್ವಹಿಸಲು ಪ್ರೇರೇಪಿಸುವುದು. . 3. ತಾಂತ್ರಿಕ ಅಧ್ಯಯನದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ಬರವಣಿಗೆ ಮತ್ತು ಬರವಣಿಗೆಯಲ್ಲಾಗುವ ದೋಷಗಳನ್ನು ಗುರುತಿಸುವ ಸಾಮರ್ಥ್ಯವನ್ನು ಬೆಳೆಸುವುದು. 4. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಅಡಗಿರುವ ಸುಪ್ತ ಪ್ರತಿಭೆಯನ್ನು ಅನಾವರಣಗೊಳಿಸುವ ನಿಟ್ಟಿನಲ್ಲಿ ಅವರಲ್ಲಿ ಕಲೆ, ಬರವಣಿಗೆ ಮತ್ತು ಭಾಷಾಂತರ ಕಲೆಯಲ್ಲಿ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು. ಎಲ್ಲದಕ್ಕೂ ಮೇಲಾಗಿ ಮಾನವೀಯ ಮೌಲ್ಯಗಳೊಂದಿಗೆ ಸರ್ವಾಂಗೀಣವಾಗಿ ಸಂವರ್ಧನೆಗೊಳಿಸಿ ಅವರನ್ನು ರಾಷ್ಟ್ರದ ಅಮೂಲ್ಯ ಸಂಪತ್ತನ್ನಾಗಿ ರೂಪಿಸುವುದು. 5. ಕರ್ನಾಟಕ ಸರ್ಕಾರದ ಸ್ಪರ್ಧಾತ್ಮಕ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ಪರೀಕ್ಷೆಯ ಬರೆಯಲು ಸಾಮರ್ಥ್ಯ ಹೊಂದಿರುತ್ತಾರೆ. 		
SAUA-I		4 Hrs..
<ol style="list-style-type: none"> 1 ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ : ಹಂಪ ನಾಗರಾಜಯ್ಯ 2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ 3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ : ಡಾ.ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ.ವಿ.ಕೇಶವಮೂರ್ತಿ 		
SAUA-II		
<ol style="list-style-type: none"> 1. ವಚನಗಳು : ಜೇಡರದಾಸಿಮಯ್ಯ, ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ 2. ಕೀರ್ತನೆಗಳು : ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೆ-ಕನಕದಾಸರು 3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಷರೀಫರು 4. ಜನಪದಗೀತೆ : ಬೀಸುವ ಪದ 		
SAUA-III		
<ol style="list-style-type: none"> 1. ಮಂಕುತಿಮ್ಮನಕಗ್ಗ : ಡಿ.ವಿ.ಜಿ. 2. ಕುರುಡುಕಾಂಚಾಣಾ : ದ.ರಾ. ಬೇಂದ್ರೆ 3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು 4. ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು : ಡಾ.ಸಿದ್ದಲಿಂಗಯ್ಯ 5. ಆ ಮರ ಈ ಮರ : ಡಾ.ಚಂದ್ರಶೇಖರ ಕಂಬಾರ 		

sAUA-iv

1. ಡಾ.ಸರ್,ಎಂ.ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ
3. 'ಕ' ಮತ್ತು 'ಬ' ಬರಹ ತಂತ್ರಾಂಶಗಳು ಕನ್ನಡದ ಟೈಪಿಂಗ್

ಸಾಂಸ್ಕೃತಿಕ ಮತ್ತು ಸಾಮಾಜಿಕ ಸಂಸ್ಕೃತಿ

“ಸಾಂಸ್ಕೃತಿಕ ಮತ್ತು ಸಾಮಾಜಿಕ ಸಂಸ್ಕೃತಿ” (ಸಾಂ)

Prasaranga VTU, Belagavi, Karnataka, 2020

ಸಾಂಸ್ಕೃತಿಕ ಮತ್ತು ಸಾಮಾಜಿಕ ಸಂಸ್ಕೃತಿ

At the end of the course the student should be able to:

- CO1: ವಿದ್ಯಾರ್ಥಿಗಳು ಬೌದ್ಧಿಕವಾಗಿ ಬೆಳೆಯುವುದರೊಂದಿಗೆ ನಮ್ಮ ನಾಡಿನ ಮತ್ತು ದೇಶದ ಸಾಂಸ್ಕೃತಿಕ ವಾರಸುದಾರರಾಗಿ ಬೆಳೆದು ಸ್ವಾವಲಂಬಿಯಾಗಿ ಬದುಕು ಕಟ್ಟಿಕೊಳ್ಳುತ್ತಾರೆ.
- CO2: ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಸಮರ್ಥವಾಗಿ ಮಾತನಾಡುವುದರೊಂದಿಗೆ, ಅನ್ಯರನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುವ ಮನೋಬಲ ಬೆಳೆಸಿಕೊಳ್ಳುತ್ತಾನೆ. ಇವತ್ತಿನ ಸಂಕೀರ್ಣವಾದ ಸಾಮಾಜಿಕ ವ್ಯವಸ್ಥೆಯಲ್ಲಿ ಸೌಹಾರ್ದಯುತ ವಾದ ನಡವಳಿಕೆಯೊಂದಿಗೆ ಸಂಪನ್ಮೂಲ ವ್ಯಕ್ತಿಯಾಗಿ ರೂಪುಗೊಳ್ಳುತ್ತಾನೆ.
- CO3: ಜಾಗತಿಕರಣದ ಸಂದರ್ಭದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳು ಸ್ವತಂತ್ರವಾಗಿ ಆಲೋಚಿಸುವ, ಸ್ವತಂತ್ರವಾಗಿ ಬರೆಯುವ, ಸ್ವತಂತ್ರವಾಗಿ ಚಿಂತನಶೀಲರಾಗುವ ಸಾಮರ್ಥ್ಯವನ್ನು ಪಡೆದು, ಸಮಯೋಚಿತವಾಗಿ ಸೂಕ್ತ ನಿರ್ಧಾರಗಳನ್ನು ಕೈಗೊಳ್ಳುವಲ್ಲಿ ಈ ಅಧ್ಯಯನ ದೀಪಸ್ಥಂಬವಾಗಿದೆ.
- CO4: ವಿದ್ಯಾರ್ಥಿಗಳು ಇಂದಿನ ಜಾಗತಿಕ ವಿದ್ಯಮಾನಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಂಡು, ಸಮಾಜದಲ್ಲಿ ಸಂಘಜೀವಿಯಾಗಿ ಬೆಳೆಯುವ ಮನೋಬಲವನ್ನು ಮತ್ತು ಆತ್ಮಸ್ವೈಯವನ್ನು ತುಂಬುವಲ್ಲಿ ಈ ಅಧ್ಯಯನ ಸೂಕ್ತವಾದ ಮಾರ್ಗದರ್ಶಕಿಯಾಗಿದೆ.

Note: Eligibility criteria for registration of Kannada subject who have studied Kannada language as one of the subjects either in tenth standard or PUC have to register Samskruthika Kannada

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	-	-
CO4	-	-	-	-	-	1	3	-	-	-	-	-

22UHS127C/22UHS227C	BALAKE KANNADA	CREDITS:01
L:T:P: 1:0:0		CIE MARKS:50
TOTAL HOURS:15HRS.		SEE MARKS:50
ಕೋರ್ಸ್‌ಉದ್ದೇಶಗಳು:		
<ol style="list-style-type: none"> 1 'ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಅಧ್ಯಯನ ದಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಅಭ್ಯಸಿಸಿಕೊಂಡು, ಕನ್ನಡದಲ್ಲಿ ಸಂವಹನ ಮಾಡಲು ಸಾಧ್ಯವಾಗುತ್ತದೆ. 2 ಕನ್ನಡ ವರ್ಣಮಾಲೆಯ ಬಗೆಗೆ ಅರಿವು ಮೂಡಿಸುವುದು ಮತ್ತು ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಆಂತರಿಕ ಸಂವಹನ ಕ್ರಿಯೆಯನ್ನು ವೃದ್ಧಿಗೊಳಿಸುವುದು. 3 ಕನ್ನಡ ಸಂಖ್ಯೆಗಳ ಬಗೆಗೆ ಅರಿವು ಮೂಡಿಸಿ, ಅವುಗಳನ್ನು ಸಮಯೋಚಿತವಾಗಿ ಬಳಸುವ ವಿಧಾನವನ್ನು ಕಲಿಸಿಕೊಡುವುದು. 4 ನಮ್ಮ ನಾಡಿನ ಸಾಂಸ್ಕೃತಿಕ ವೈವಿಧ್ಯತೆಯನ್ನು ಅರಿತು, ಅಭ್ಯಸಿಸಿಕೊಂಡು ನಾಡಜನರೊಂದಿಗೆ ಸೌಹಾರ್ದಯುತವಾಗಿ ಬದುಕಲು ಕಲಿಸುವುದು. 		
UNIT-I		4 Hrs..
<ul style="list-style-type: none"> • Necessity of learning a local language: • Tips to learn the language with easy methods. • Easy learning of a Kannada Language: A few tips • Hints for correct and polite conversation • Key to Transcription <p>Lessons to teach and Learn Kannada Language</p> <ol style="list-style-type: none"> 1. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal pronouns, possessive Forms, Interrogative words 2. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮ ಪದಗಳು- Possessive forms of nouns, dubitive question and Relative nouns 3. ಗುಣಪರಿಮಾಣ ಮತ್ತು ಫಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು - Qualitative, Quantitative and Colour Adjectives, Numerals 		
UNIT-II		4 Hrs..
<ol style="list-style-type: none"> 1. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು - Ordinal numerals and plural markers 2. ನ್ಯೂನ/ ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ಫಣ ಗುಣವಾಚಕಗಳು - Defective/Negative Verbs and Colour Adjectives 3. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥ ರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words Imparative words and sentences 4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತುಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ - Comparitive, Relationship, identification and Negation words 		

UNIT-III		4 Hrs..
1.ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು Different types of forms of Tense, Time and Verbs 2.ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು – Kannada words in Conversation 3.ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮತ್ತು ರಾಜ್ಯದ ಬಗ್ಗೆ ಕುರಿತಾದ ಇತರೆ ಮಾಹಿತಿಗಳು- Karnataka State and General information about the State 4.ಭಾಷೆ ಕಲಿಯಲು ಏನನ್ನು ಮಾಡಬೇಕು ಮತ್ತು ಮಾಡಬಾರದು – Do’s and don’ts in learning a language		
UNIT-IV		4 Hrs..
1.Kannada language script part - 1 2.Kannada language script part - 1		
ಬಳಕೆ ಕನ್ನಡ –“Balake Kannada” -		
Author : Dr. L Thimmesha Published by Prasaranga, Visvesvara a Technolo ical Universi , Bela avi, Karnataka.		
ಪರೀಕ್ಷಾ ಅಂಶಗಳು		
At the end of the course the student should be able to: CO1: ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಸುಲಭವಾಗಿ ಅರ್ಥೈಸಿಕೊಂಡು, ಸಾಮಾಜಿಕವಾಗಿ,ಆರ್ಥಿಕವಾಗಿ ಆಯಾ ಪ್ರದೇಶದ ಜನರೊಂದಿಗೆ ಅನೋನ್ಯವಾಗಿ ವ್ಯವಹರಿಸುತ್ತಾರೆ. CO2: ಈ ಪಠ್ಯಾಧ್ಯಯನದಿಂದ ವಿದ್ಯಾರ್ಥಿಯು ಆಯಾ ಪ್ರದೇಶಗಳ ನಂಬಿಕೆ,ಸಂಪ್ರದಾಯ ಮತ್ತು ಆಚರಣೆಗಳನ್ನು ಸುಲಭವಾಗಿ ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ಸಾಧ್ಯವಾಗುತ್ತದೆ. CO3: ಕನ್ನಡ ಸಂಖ್ಯೆಗಳ ಪರಿಕಲ್ಪನೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಯು ವಾಣಿಜ್ಯ ವ್ಯವಹಾರಗಳನ್ನು ಸುಲಭವಾಗಿ ನೆರೆವೇರಿಸಲು ಸಾಧ್ಯವಾಗುತ್ತದೆ. CO4: ಹಂತಹಂತವಾಗಿ ವಿದ್ಯಾರ್ಥಿಯು ಕನ್ನಡ ಭಾಷೆಯಲ್ಲಿ ಬರವಣಿಗೆಯ ಕಲೆಯನ್ನು ಮತ್ತು ಓದುವ ಕಲೆಯನ್ನು ಬೆಳೆಸಿಕೊಳ್ಳುತ್ತಾನೆ.		

Note: Eligibility criteria for registration of Kannada subject who have studied Kannada language as one of the subjects either in tenth standard or PUC have to register Samskruthika Kannada

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-

22UHS129C/22UHS229C	INNOVATION AND DESIGN THINKING	CREDIT: 01
L:T:P: 1:0:0		CIE MARKS:50
TOTAL HOURS: 15HRS.		SEE MARKS:50
Course Objectives:		
1. To explain the concept of design thinking for product and service development 2. To explain the fundamental concept of innovation and design thinking. 3. To discuss the methods of implementing design thinking in the real world.		
UNIT - I		3Hrs.
Understanding Design thinking:		
Introduction about the design thinking, steps in Design Thinking Empathize, Design, Ideate, Prototype and Test, Explore presentation signers across globe–MVP or Prototyping.		
UNIT – II		4Hrs.
Tools for Design Thinking: Importance of tools for design thinking, Visualization, Journey mapping, Value chain analysis, Mind mapping, Rapid concept development, Assumption testing, Prototyping, Customer co-creation, Learning launches, Storytelling.		
UNIT – III		4Hrs.
Design Thinking in IT:		
Agile in Virtual collaboration environment – Scenario based Prototyping.		
DTF or strategic innovations: Growth – Story telling representation, predictability- Strategic Foresight, Change – Sense Making,		
UNIT – IV		4Hrs.
Design Thinking in IT:		
Agile in Virtual collaboration environment – Scenario based Prototyping.		
DTF or strategic innovations: Growth – Story telling representation, predictability- Strategic Foresight, Change – Sense Making,		
Reference Books:		
1. John R. Karsnitz, Stephen O’ Brien and John P. Hutchinson, “Engineering Design”, Cengage learning (International edition)2 nd edition,2013. 2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009. 3. Hasso Plattner, Christoph Meinel and Larry Leifer, "Design Thinking : Understand–Improve–Apply",Springer, 2011 4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Businessor Design School", John Wiley & Sons 2013. 5. Yousef Haik and Tamer M. Shahin, “Engineering Design Process”, Cengage Learning, 2 nd edition, 2011.		
Course Outcomes:		
After completion of the course the students will be able to,		
CO1: Demonstrate the knowledge and concepts of design thinking.		
CO2: Analyze various tools of design thinking and use an appropriate tool for design thinking.		
CO3: Describe the role of design thinking in IT industry.		
CO4: Demonstrate design thinking solutions to business challenges.		

