

Basaveshwar Engineering College, Bagalkote
B.E I - Semester Scheme of Teaching and Examinations
(Academic year 2022-23)

I - Semester (Civil Engineering Stream)

Branch: CV

(Physics Group)

Sl. No.	Course			TD	Teaching (Hours/Week)				Examination			Credits	
	Category	Code	Title		Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P	S					
1.	ASC (IC)	22UMA102C	Mathematics for Civil Sciences - I	Mathematics	3	0	2	0	3	50	50	100	4
2.	ASC (IC)	22UPH106C	Physics for Civil Sciences	Physics	3	0	2	0	3	50	50	100	4
3.	ESC	22UCV117C	Engineering Mechanics	Civil	3	0	0	0	3	50	50	100	3
4.	ESC - I	22UXXXXXXN	Engineering Science Course - I	Respective Engg. Dept.	2	0	2	0	3	50	50	100	3
5.	ETC - I	22UXXXXXXB	Emerging Technology Course - I	Any Engg. Dept.	3	0	0	0	3	50	50	100	3
6.	HSSC	22UHS124C	Communicative English	Humanities	1	0	0	0	1	50	50	100	1
7.	HSSC	22UHS125C	Constitution of India	Humanities	1	0	0	0	1	50	50	100	1
8.	AEC	22UHS128C	Scientific Foundations of Health	Any Dept	1	0	0	0	1	50	50	100	1
Total					17		6	0		400	400	800	20
SDA : Skill Development Activities TD : Teaching Department ASC : Applied 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													

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 shall not be 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 2022-23)

II - Semester (Civil Engineering Stream)

Branch: CV

(Chemistry Group)

Sl. No.	Course			TD	Teaching (Hours/Week)				Examination				Credits
	Category	Code	Title		Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1.	ASC (IC)	22UMA202C	Mathematics for Civil Science - II	Mathematics	3	0	2	0	3	50	50	100	4
2.	ASC (IC)	22UCH210C	Chemistry for Civil Sciences	Chemistry	3	0	2	0	3	50	50	100	4
3.	ESC	22UME223C	CAED	Civil / Mechanical	2	0	2	0	3	50	50	100	3
4.	ESC - I	22UXXXXXN	Engineering Science Course-I	Respective Engg. Dept	3	0	0	0	3	50	50	100	3
5.	PLC - I	22USXXXXB	Programming Language Course-I	Any Engg. Dept	2	0	2	0	3	50	50	100	3
6.	HSSC	22UHS224C	Professional Writing Skills in English	Humanities	1	0	0	0	1	50	50	100	1
7.	HSSC	22UHS226C 22UHS227C	Samskruthika Kannada* Balake Kannada**	Humanities	1	0	0	0	1	50	50	100	1
8.	AEC	22UHS229C	Innovation and Design Thinking	Any Dept	1	0	0	0	1	50	50	100	1
Total					16		8	0		400	400	800	20
SDA : Skill Development Activities TD : Teaching Department ASC : Applied 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													

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 shall not be 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
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	

22UMA102C	Mathematics for Civil Sciences-I (Integrated)	04-Credits
Hrs/Week: 3:0:2		CIE Marks:50
Total Hours: 60Hrs (40L+20P)		SEE Marks:50

Course Objectives:

1. Familiarize the importance of calculus associated with one variable and two variables for Civil engineering.
2. Analyze Civil engineering problems applying Ordinary Differential Equations.
3. Develop the knowledge of Linear Algebra referring to matrices.

UNIT – I	10 Hrs
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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.

(RBT Levels: L1, L2 and L3)

Web links and Video Lectures (e-Resources):

1. Introduction to Polar coordinates: Unit-I <https://youtu.be/aSdaT62ndYE>
2. Polar Equation to Rectangular equation https://youtu.be/flTz_pSzVFI
3. Rectangular equation to polar equation <https://youtu.be/fTBkr27r3pw>
4. How to Graph polar equations <https://youtu.be/jO4lwddfeDA>
5. Examples on angle between radius vector and tangent <https://youtu.be/RZx377w4nc>
6. Curvature <https://youtu.be/EMo0vaphXpU>
<https://youtu.be/ugtUGhBSeE0>
<https://youtu.be/gspjhwSNMWs>

UNIT – II	10 Hrs
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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.

(RBT Levels: L1, L2 and L3)

Web links and Video Lectures (e-Resources):

1. Why Taylors and Maclaurins series UNIT-II

<https://youtu.be/eX1hvWxmJVE>

<https://youtu.be/LDBnS4c7YbA>

2. Indeterminate forms

<https://youtu.be/oEEXnyupzdo>

<https://youtu.be/Gh48aOvWcxw>

3. Partial differentiation and its visualization

<https://youtu.be/AXqhWeUEtQU>

<https://youtu.be/dfvnCHqzK54>

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 $1/x$ ($\frac{dy}{y} - \frac{y}{x^2} dx$) $\frac{dy}{y} 1/x$ ($\frac{dy}{y} - \frac{y}{x^2} dx$). 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.

(RBT Levels: L1, L2 and L3)

Web links and Video Lectures (e-Resources):

1. Linear and Bernoulli's equation

<https://youtu.be/gd1FYn86P0c>

https://youtu.be/BoI_ej-T0V4

https://youtu.be/Ez8_t8X2bAI

<https://youtu.be/mcjchG4q2Yk>

2. Second order DE

<https://youtu.be/uI2xt8nTOIQ>

<https://youtu.be/AYMPeaYz0Tg?list=PLX2gX-ftPVXVQkHNzmZGsdSaZt7GExpnC>

<https://youtu.be/u5h0pQC9xmc?list=PLX2gX-ftPVXVQkHNzmZGsdSaZt7GExpnC>

<https://youtu.be/L8dAVcRC1b8?list=PLX2gX-ftPVXVQkHNzmZGsdSaZt7GExpnC>

<https://youtu.be/wkSjoYHatww?list=PLX2gX-ftPVXVQkHNzmZGsdSaZt7GExpnC>

<https://youtu.be/q2cJPho-qx0>

<https://youtu.be/O-9-IXO923o>

3. How to solve second order DE using scilab

<https://youtu.be/tOL5ErEOK90>

https://youtu.be/tg_QM9b1bdA

<https://youtu.be/UkZmROLRzRA>

UNIT – IV

10 Hrs

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. Eigen values and Eigenvectors, Rayleigh's power method to find the dominant Eigen value 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.

(RBT Levels: L1, L2 and L3)

Web links and Video Lectures (e-Resources):

1. Linear Algebra : Introduction

<https://youtu.be/0oGJTQCy4cQ?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng>

2. system of equations

<https://youtu.be/TD069mR-AF0>

<https://youtu.be/EC2mgUZyzoA?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng>

<https://youtu.be/AUqeb9Z3y3k?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng>

<https://youtu.be/GeDEr4Px2yc>

<https://youtu.be/Rks9llk1w2o>

3. Reduced row echelon form

<https://youtu.be/ccadWg3ZwEg>

<https://youtu.be/LOCmbneYETs?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng>

4. Rank of a Matrix

<https://youtu.be/JahgX2Bi6cQ>

List of Laboratory experiments

1	2D Plots for Cartesian curves <ol style="list-style-type: none">Plot of parabola $y = x^2$, and $y = \sin x$, $y = \tan x$Plot of Perfect parabola $y = x^2$Change the color (Green) of perfect color perfect parabolaChange the color (Red) of perfect color perfect parabolaDraw a red color with '-' perfect parabolaDraw a red color with '*' perfect parabolaDraw a red color with axes label perfect parabolaDraw a perfect parabola with animationDraw parametric curves cycloid<ol style="list-style-type: none">$x = a(t + \sin t)$, $y = a(1 + \cos t)$$x = a(t - \sin t)$; $y = a(1 - \cos t)$$x = a(t - \sin t)$; $y = a(1 + \cos t)$$x = a(t + \sin t)$, $y = a(1 - \cos t)$$x = t^2$, $y = t - (t^3/3)$
2	Plotting of polar <ol style="list-style-type: none">Cardioid $r = a + b \cos \theta$Cardioid $r = a + b \cos \theta$, if $a > b$Cardioid $r = a + b \cos \theta$, if $b > a$Draw polar petals $r = 2 \cos 4\theta$$R = 2 \cos \theta$, $r = 2 \cos 7\theta$, $r = 2 \cos 6\theta$, $r = 2 \cos 5\theta$Cardoid $r = a(1 + \cos \theta)$Cardoid $r = a(1 - \cos \theta)$Draw histogram curves
3	<ol style="list-style-type: none">Plot 3-d Surface $z = x^2 + y^2$Plot 3-d color Surface $z = x^2 + y^2$Plot 3-d Surface $z = x^4 + y^4$Plot 3-d Surface $z = \sin t \cos t$
4	<ol style="list-style-type: none">To calculate volume of a sphereTo Evaluate $\int_0^5 x dx$ and $\int_0^5 \sin x dx$
5	<ol style="list-style-type: none">Solve first order o.d.e. $\frac{dy}{dx} = e^{-x}$, $x = 0$, $y = 0$Solve first order o.d.e. $\frac{dy}{dx} + e^{-x}y = x^2$, $x = 0$, $y = 0$ <p>Note: Change the initial conditions and observe the graph</p>
6	<ol style="list-style-type: none">Solve $2y'' - 5y' + y = 0$, $y(3) = 6$, $y'(3) = 1$.

22UPH106C/22UPH206C	PHYSICS FOR CIVIL SCIENCES (CV Branch) (Integrated)	04: Credits
Hours/Week: (3:0:2)		CIE Marks:50
Total Hours: 60 Hrs (40L+20 P)		SEE Marks:50

Course Objectives:

1. To study the properties, generation and engineering applications of types of oscillations and shockwaves
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.

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.

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.

Pre-requisites: Basics of oscillations, properties of light

Self-learning: Simple harmonic motion, differential equation for SHM

UNIT-II

10 Hrs.

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.

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.

Pre-requisites: Basics of Sound,

Self-learning: Introduction to acoustics, Propagation mechanism and TIR in optical fiber

UNIT-III

10 Hrs.

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.

Radiometry and Photometry: Radiation quantities, Spectral quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).

Pre-requisites: Elasticity, Stress and strain

Self-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

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. NewDelhi-110055.
3. R. K. Gaur and S. L. Gupta, 2010, "Engineering Physics", 8thedition, Dhanpat Rai publications Ltd., New Delhi
4. B. B. Laud, 2002, "Lasers and Non-Linear Optics", 2ndedition, 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 Bukshab, 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", 2ndEdition. 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-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>

Laboratory Component:

Any Ten experiments have to be completed from the list of experiments

LIST OF EXPERIMENTS

1. Determination of effective spring constant of the given springs in series and parallel combination
2. Study of forced mechanical oscillations and resonance
3. The study of frequency response in series and parallel LCR circuits
4. Identification of passive components and estimation of their values in a given black Box
5. Characteristics of a Laser using diffraction grating
6. Determination of acceptance angle and numerical aperture of the given optical fiber
7. Determination of rigidity modulus of a wire by torsional pendulum method
8. Determination of Young's modulus of a metal strip by single cantilever method
9. Determination of Young's modulus of a material of the given bar by uniform bending
10. Determination of Fermi energy for a conductor
11. Determination of resistivity by four probe method
12. Determination of Planck's constant using LEDs
13. Determination of dielectric constant by RC charging and discharging method
14. Measurement of velocity of ultrasonic waves in a liquid using ultrasonic interferometer
15. Determination of viscosity of castor oil by Stokes method
16. Determination of radius of curvature of the given plano convex lens by setting Newton's Rings
17. Step interactive physics simulations
18. Study of motion using spread Sheets
19. Application of Statistics using Spread Sheet
20. PHET Interactive Simulations
<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

Course outcomes:

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

CO1: Apply concepts of oscillations and select appropriate properties of lasers for engineering applications

CO2: Select the appropriate type of optical fiber and apply concepts of acoustics for engineering applications

CO3: Apply the concepts of elasticity, radiometry and photometry for engineering applications

CO4: 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	03-Credits
Hrs/Week: 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
<p>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.</p> <p>Forces in Space: Resultant of non-coplanar concurrent forces. Equilibrium of non-coplanar concurrent forces. Numerical Problems.</p>	
UNIT – II	10 Hrs
<p>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.</p> <p>Support Reaction: Types of beams, loads and supports. Support reaction of statically determinate beams subjected to various loads. Numerical problems.</p>	
UNIT - III	10 Hrs
<p>Analysis of Trusses: Introduction, classification of trusses, analysis of plane perfect truss by the method of joints and method of sections. Numerical examples.</p> <p>Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane & inclined plane and ladder friction. Numerical examples.</p>	
UNIT - IV	10 Hrs
<p>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.</p> <p>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.</p>	
<p>Reference books:</p> <ol style="list-style-type: none"> 1. Beer F.P. and Johnston E. R., <i>Mechanics for Engineers, Statics</i>, 2011, McGraw Hill Publications. 2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, <i>Basic Civil Engineering and Engineering Mechanics</i>, 2015, Laxmi Publications. 3. Kolhapure B. K., <i>Elements of Civil Engineering and Engineering Mechanics</i>, 2014, EBPB 4. Singer F.L., <i>Engineering Mechanics statics and dynamics</i> 3rd Edition, Horper and International New York, 1975. 	

5. Irving H. Shames, *Engineering Mechanics*, 2019, Prentice-Hall.
6. Hibbler R. C., *Engineering Mechanics: Principles of Statics and Dynamics*, 2017, Pearson Press.
7. Timoshenko S., Young D. H., Rao J. V., *Engineering Mechanics*, 5th Edition, 2017, Pearson Press.
8. Bhavikatti S. S., *Engineering Mechanics*, 2019, New Age International.
9. Reddy Vijaykumar K. and Suresh Kumar K, *Engineering Mechanics*, 2011, BS publication

Course Outcomes:

CO1: Analyse the resultant and equilibrium of concurrent forces.

CO2: Apply the action for forces, moments and other types of loads on rigid bodies and compute the reactive forces.

CO3: Analyse the frictional resistance offered by different planes.

CO4: Locate the centroid and compute the moment of inertia of plane areas.

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

22UME122N/22UME22N	Introduction To Mechanical Engineering	03 Credits
Hrs./Week: 3:0:0		CIEMarks:50
Total Hours: 40Hrs		SEEMarks:50

UNIT-I	10Hrs.
<p>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.</p> <p>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</p> <p>Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys.</p>	
UNIT-II	10Hrs.
<p>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).</p> <p>Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.</p> <p>Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.</p>	
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 3rd Ed., 2003.
3. V. Ganesan, Internal Combustion Engines, Tata McGraw Hill Education; 4th edition, 2017
4. Appu Kuttan KK, Robotics,. K International Pvt Ltd, volume 1
5. Dr. SRN Reddy, RachitThukral and Manasi Mishra, “Introduction to Internet of Things: A Practical Approach”, ETI Labs
6. Raj kamal, “Internet of Things: Architecture and Design”, McGraw hill.
7. K R Gopala Krishna, Elements of Mechanical Engineering, Subhash Publications, 2008
8. Jonathan Wickert and Kemper Lewis, An Introduction to Mechanical Engineering, Third Edition, 2012

Course Outcomes:

CO1: Explain the role of Mechanical Engineering w.r.t 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	1	1	-	2	-	-	-	-	1	-	-	1
CO2	1	2	1	-	-	-	-	-	-	1	-	1
CO3	1	2	1	-	-	-	-	-	-	1	-	1
CO4	1	1	-	-	2	-	-	-	-	1	-	1

22UEE116N/22UEE216N

Introduction to Electrical Engineering

03-Credits

Hrs/Week: 3:0:0		CIE Marks: 50
Total Hours: 40Hrs		SEE Marks: 50

Course Objectives:

1. To study the basics of DC, single phase & three phase circuits and electrical earthing
2. To illustrate the laws of DC circuit, concepts of single phase & three phase AC circuits, domestic wiring practices and electricity generation principles, construction-working principle-applications of electrical machines & transformers
3. To apply circuit laws and concepts to calculate different parameters of DC circuits, single phase & three phase AC circuits
4. To evaluate the emf induced in generators & transformers under given conditions and assess energy consumption in domestic loads

UNIT – I	10 Hrs
<p>Introduction: General structure of electrical power systems using single line diagram approach. Power Generation: Hydel, thermal, nuclear power plants (block diagram approach). 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). 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. Electrical Energy Calculation: Power rating of household appliances, two-part electricity tariff, calculation of electricity bill for domestic consumers. 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>	
<p>Reference books:</p> <ol style="list-style-type: none"> 1. B.LTheraja, “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”, 2nd Edition, PHI Learning, 2009 5. V.N.Mittle & A.Mittal, “Basic Electrical Engineering”, Tata McGraw-Hill Education, 2005 	
<p>Course Outcomes: After completion of the course students will be able to,</p>	

- 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:** Analyse the working principle and construction and 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 Mapping Table

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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

22UEC114N/22UEC214N	Introduction to Electronics Engineering	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50

Course Objectives:

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, Multivibrators, Single-stage astable 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.(Text 1)</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. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-84. 3. D P Kothari, I J Nagrath, ‘Basic Electronics’, 2nd edition, McGraw Hill Education (India), Private Limited, 2018 	
Course Outcomes:	
A student who successfully completes this course should 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	Introduction to C Programming (Integrated)	03-Credits
Hrs/Week: 2:0:2		CIE Marks:50
Total Hours: 40Hrs (28T+12 P)		SEE Marks:50

Course Objectives:

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	08 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	08 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 and Unions: Defining a structure, Declaring structure variables, Accessing structure members, Initialization, Arrays of structure, Structures and Functions.</p>	
<p>Programming Exercises:</p> <p style="text-align: center;">Part – A</p> <ol style="list-style-type: none"> 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 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.

Reference books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw Hill Publications, 2017.
2. Reema Thareja, Computer fundamentals and programming in c, Oxford University, Second edition, 2017.
3. Kernighan and Ritchie, C Programming Language, 2nd Edition, 1988, 49th Reprint, 2017
4. Wesley J. Chun, A Structured Programming approach using C, Pearson Education India, 3rd Edition, 2015.
5. Stephen Kochan, Programming in C, 4th Edition, 2014
6. B. S. Anami, S. A. Angadi & S. S. Manvi, Computer Concepts and C programming-A Holistic approach to learning C, 2nd Edition, PHI, 2010

22UEC134B	Introduction to Embedded System	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

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:

A student who successfully completes this course should 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	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

22UEC135B	Introduction to Communication Technology	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

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	2	3	-	2	2	-	-	-	-	-	-
CO2	3	3	2	-	2	1	-	-	-	-	-	-
CO3	3	2	3	-	3	-	1	-	-	-	-	-
CO4	2	1	1	-	3	1	1	-	-	-	-	-

22UEE136B	Renewable Energy Sources	03-Credits
Hrs/Week: 3:0:0		CIE Marks: 50
Total Hours: 40Hrs		SEE Marks: 50

Course Objectives:

1. To study energy scenario of solar, wind, biomass, geothermal and ocean energy conversion systems.
2. To explore various concepts and theory related to solar, wind, biomass, geothermal and ocean energy conversion systems.
3. To apply the principles and simple numerical problems of renewable energy conversion systems.
4. To illustrate the similarities and differences of the features of solar, wind, biomass, geothermal and ocean energy conversion systems.

UNIT – I	10 Hrs
<p>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.</p> <p>Solar Energy Basics: Introduction, solar constant, basic sun-earth angles – definitions and their representation; solar radiation geometry, solar radiation data measuring instruments – Pyranometer and Pyrheliometer.</p>	
UNIT – II	10 Hrs
<p>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.</p> <p>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.</p>	
UNIT – III	10 Hrs
<p>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.</p> <p>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.</p>	
UNIT – IV	10 Hrs
<p>Geothermal Energy: Introduction, classification, conversion technologies, applications, advantages and limitations of geothermal resources.</p> <p>Energy from Ocean: Principle of tidal power, components of Tidal Power Plant (TPP), classification, advantages and limitations of TPP.</p> <p>Ocean Thermal Energy Conversion (OTEC): Principle of OTEC system, types of OTEC power generation, block diagram, applications, advantages and limitations.</p>	

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,

1. Identify electrical and mechanical devices of solar, wind, biomass, geothermal and ocean energy conversion systems.
2. Measure performance parameters related to solar, wind, biomass, geothermal and ocean energy conversion systems.
3. Compute the power generation of wind and solar energy correspond to variable data.
4. Compare the features of solar, wind, biomass, geothermal and ocean energy conversion systems.

Course Outcomes - Programme Outcomes Mapping Table

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	Green Buildings	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

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
<p>Introduction to the concept of cost effective construction</p> <p>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</p>	
UNIT – II	10 Hrs
<p>Environment friendly and cost effective Building Technologies</p> <p>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.</p> <p>Global Warming</p> <p>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.</p>	

UNIT - III	10 Hrs
<p>Green Building rating Systems</p> <p>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)</p>	
UNIT - IV	10 Hrs
<p>Utility of Solar Energy in Buildings</p> <p>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.</p> <p>Green Composites for Buildings</p> <p>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 Environ</p>	
<p>Reference books:</p> <ol style="list-style-type: none"> 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. 	
<p>Course Outcomes:</p> <p>CO1: Select different building materials for cost effective construction</p> <p>CO2: Apply effective environmental friendly building technology to reduce global warming</p> <p>CO3: Analyse buildings for green rating systems.</p> <p>CO4: Use alternate source of energy and effective use of water.</p>	

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	Waste Management	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50

Course Objectives:

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:

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. McDougall, 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	Introduction to Internet of Things (IoT)	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

1. Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.
2. 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 Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4	
UNIT – II	10 Hrs
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Textbook 1: Chapter 5 – 5.1 to 5.9 IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5	
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. Textbook 1: Chapter 10– 10.1 to 10.6 IOT CASE STUDIES Agricultural IoT – Introduction and Case Studies Textbook 1: Chapter 12- 12.1-12.2	
UNIT - IV	10 Hrs
IOT CASE STUDIES AND FUTURE TRENDS Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1	
Reference books:	
<ol style="list-style-type: none">1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, “Introduction to IoT”, Cambridge University Press 2021.2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.3. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.4. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.	
Course Outcomes:	
At the end of the course, the students able to. CO1: Comprehend the fundamentals of IoT viz..., evolution, networking components, and addressing strategies. CO2: Identify various sensing & actuator devices and types driving the characteristics of IoT system.	

CO3: Analyse the processing in IoT.
CO4: Use appropriate IoT Technologies to implement an application.
CO5: Illustrate the architectures of IoT application for an open ended problem. **Course Articulation**

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

22UCS141B	Introduction to Cyber Security	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

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., Global Perspectives													
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, methods of phishing, 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, 2011, First Edition 2. Rajkumar Singh Rathore, Mayank Bhushan, “Fundamentals of Cyber Security”, BPB; 2017, First Edition 3. Anand Shinde, “Introduction to Cyber Security”, 2020, Notion Press, First Edition 4. Nilakshi Jain and Dhananjay R. Kalbande, “Cyber Security and Cyber Laws”, Wiley India Pvt Ltd., 2020 													
Course Outcomes:													
<p>CO1: Explain the cybercrime terminologies and laws. CO2: Illustrate tools and methods used on Cybercrime CO3: Describe the different forms of attacks, Phishing and Identity Theft CO4: Comprehend cyber offences and Botnets CO5: Justify the need of computer forensics</p>													
Course Outcomes	Programme Outcomes												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> <th>12</th> </tr> </table>	1	2	3	4	5	6	7	8	9	10	11	12
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	Composite Materials					03-Credits							
Hrs./Week: 3:0: 0						CIEMarks:50							
Total Hours: 40Hrs						SEEMarks:50							

UNIT-I	10Hrs.
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	10Hrs.
Polymer matrix composites	
Introduction, Polymer matrices, Processing methods like Lay up and curing, open and closed mold process- hand lay up 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	10Hrs.
Mechanics of composite materials:	
Continuous fibers, Iso-stress condition, Iso-strain condition, Numericals on modulus of rigidity, and mechanics of discontinuous fibers, stress Vs strain curves for PMCs, MMCs and CMCs. Cutting and machining 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, Composite Materials: Engineering and Science, Rawlings, 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. Avtar Kaw, 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. Illustrate the types of composites. Factors influencing the mechanical behaviour.	
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. Illustrate the cutting and joining of composites.	

Course Outcomes	Programme Outcomes (POs)											
	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	Introductions to Robotics	03 - Credits
Hrs./Week: 3:0:0		CIE Marks: 50
Total Hours: 40Hrs		SEE Marks: 50

UNIT - I	10 Hrs.
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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.
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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.
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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.
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ROBOT APPLICATIONS

Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management. Applications, Micro and Nano-robots, Future Applications.

Reference books:

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:

On completion of the course the student will be able to:

CO1: List and explain 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 (POs)											
	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	Biomass and Bioenergy	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

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
<p>Biomass Biomass: 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. 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
<p>Types of Bioenergies: First generation, Second generation, third generation and next/future generation fuels Biomass Conversions Technologies: Physical conversion: Dewatering, drying, size reduction, steam explosion, densification, pelleting, chipping, oil extraction. Thermochemical conversion: Oil trans-esterification Chemical conversion: Lignocellulosic conversion (2G technology) Biochemical conversion -Anaerobic digestion (biogas production from organic waste and Waste water), CBG. Fermentation (bioethanol production)</p>	
UNIT - III	10 Hrs
<p>Thermal conversion: Combustion plants for heat generation: wood and pellet burning stoves; wood, pellet and wood chips boiler. Gasification plants, Pyrolysis plants. 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
<p>Bio-Energy and Bio-Refinery 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>	
<p>Reference books:</p> <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:

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

CO2: Interpret & describe biomass conversion technologies.

CO3: Acquire knowledge of Innovative bioenergy plants.

CO4: Interpret & 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

22UHS124C	Communicative English	01-Credit
Hrs/Week: 1:0:0		CIE Marks:50
Total Hours: 15Hrs		SEE Marks:50

Course Objectives:

- 1.To know about Fundamentals of Communicative English and Communication Skills in general.
2. To train the students 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& 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 &Preposition, kinds of Preposition and Prepositions often Confused. Articles: Use of Articles – Indefinite and Definite Articles, Verbs &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, Words 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. A Textbook of English Language Communication Skills, Infinite Learning Solutions (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 [Latest Revised Edition] - 2019. 6. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – 2019. 	

22UHS125C	Constitution of India	01-Credit
Hrs/Week: 1:0:0		CIE Marks:50
Total Hours: 15Hrs		SEE Marks:50

Course Objectives:

1. To realize the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.
2. To identify the importance of fundamental rights as well as fundamental duties.
3. To understand the functioning of Union and State Governments in Indian federal system.
4. To review procedure and effects of emergency, composition and activities of election commission.

UNIT – I	04 Hrs
Introduction to Indian constitution: The Salient Features of the Indian Constitution. Preamble to the Constitution of India. Fundamental Rights, Directive Principles of State policy and Fundamental Duties.	
UNIT – II	04 Hrs
The Union Government: The Union Executive, The Union Legislature and The Union Judiciary - The Supreme Court of India.	
UNIT – III	04 Hrs
The State Government: The State Executive, The State legislature and The State Judiciary	
UNIT – IV	03 Hrs
Election provisions, Emergency provisions and Amendment of the constitution.	
Reference books:	
<ol style="list-style-type: none"> 1. M. V. Pylee, “Introduction to the Constitution of India”, 4th Edition, Vikas publication, 2005. 2. Durga Das Basu (D. D. Basu), “Introduction to the constitution of India”, (Student Edition), 19th edition, Prentice-Hall EEE, 2008. 3. Venkatesh B. R. and Merunandan K. B, ‘An introduction to the constitution of India and Profession Ethics’, Idea International Publication, Bangalore. 4. K. R. Phaneesh, ‘The Constitution of India and Profession of Ethics’, Sudha Publication, Bangalore. 	
Course Outcomes:	
At the end of the course the student should be able to:	
CO1: Analyse the significance of Indian Constitution as the fundamental law of the land.	
CO2: Exercise his/her fundamental rights in proper sense at the same time identifies his/her responsibilities in national building.	
CO3: Asses the Indian political system, the powers and functions of the Union and State Governments.	
CO4: Elaborate Electoral Process, Emergency provisions and Amendment procedure.	

22UHS128C	Scientific Foundations of Health	01-Credit
Hrs/Week: 1:0:0		CIE Marks:50
Total Hours:15Hrs		SEE Marks:50

Course Objectives:

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. Jane Ogden, Health Psychology - A Textbook, 4th edition 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 / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes 	
Course Outcomes:	
At the end 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)	04-Credits
Hrs/Week: 3:0:2		CIE Marks:50
Total Hours: 60Hrs (40T+ 20P)		SEE Marks:50

Course Objectives:

1. Familiarize the importance of Integral calculus and Vector calculus essential for civil Engineering.
2. Analyze Civil engineering problems by applying Partial Differential Equations.
3. Develop the knowledge of solving civil engineering problems numerically.

UNIT – I	10 Hrs
<p>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. Self-Study: Volume by triple integration, Center of gravity. Applications: Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models. (RBT Levels: L1, L2 and L3)</p>	
UNIT – II	10 Hrs
<p>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. (RBT Levels: L1, L2 and L3)</p>	
UNIT – III	10 Hrs
<p>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) (RBT Levels: L1, L2 and L3)</p>	
UNIT – IV	10 Hrs
<p>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</p>	

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.

(RBT Levels: L1, L2 and L3)

List of Laboratory experiments:

1.	Program to compute area, surface area, volume and centre of gravity
2.	Evaluation of improper integrals
3.	Finding gradient, divergent, curl and their geometrical interpretation
4.	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
5.	Computing the inner product and orthogonality
6.	Solution of algebraic and transcendental equations by Ramanujan's, Regula-Falsi and Newton-Raphson method
7.	Interpolation/Extrapolation using Newton's forward and backward difference formula
8.	Computation of area under the curve using Trapezoidal, Simpson's (1/3) rd and (3/8) th rule
9.	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's Method
10.	Solution of ODE of first order and first degree by Runge-Kutta 4 th order and Milne's 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 volume I and volume II, 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.

Course Outcomes:

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

CO1: Apply the knowledge of multiple integrals to compute area and volume.

CO2: Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.

CO3: Demonstrate partial differential equations and their solutions for physical interpretations.

CO4: Apply the knowledge of numerical methods in solving physical and engineering phenomena.

22UCH210C	Chemistry for Civil Sciences (Integrated)	04-Credits
Hrs/Week: 3:0:2		CIE Marks:50
Total Hours: 60hrs. (40T + 20P)		SEE Marks:50

Course Objectives:

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
<p>Chemistry of Water and Environment</p> <p>Water technology: Introduction, water quality parameters, hardness of water, determination of total 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, water quality assessment, effect of oxygen demanding waste water, Sewage treatment; Primary, secondary and tertiary 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
<p>Analytical Techniques and Corrosion Science</p> <p>Analytical Techniques: Sensors, Introduction, basic principle of sensor, Types of sensors; Conductometric sensors, Electrochemical sensors, Thermometric 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>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>Self Study: Use of Corrosion inhibitors to control corrosion. Corrosion control by organic coatings.</p>	

UNIT - III**10 Hrs****Structural Materials**

Metals and Alloys: Introduction, Properties and application of Iron and its alloys, Aluminium and its alloys.

Cement: Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement.

Refractories: Introduction, classification based on chemical composition, properties and application of refractory materials.

Glass: Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of glass.

Nano materials: Introduction, size dependent properties of nanomaterial (surface area and catalytic), Synthesis of nanomaterial by sol-gel method and co-precipitation method. Synthesis, properties and engineering applications of carbon nanotubes and graphene. Nanomaterials for water treatment, Introduction and example.

Self Study: Chemistry of reinforced concrete from various sources of water (seawater, groundwater, treated water).

UNIT - IV**10 Hrs****Polymers and Composites**

Polymer: Introduction, monomer, polymer, polymerization, degree of polymerization. Molecular weight of polymers, Weight average and number average molecular weight of polymer. Numerical problems. Synthesis, properties and engineering applications of Acrylo Butadiene Styrene (ABS) plastics and Silicon rubber.

Fibers: Introduction, Synthesis, properties & applications of Rayon & Nylon fibers.

Polymer composites: Introduction, properties and applications of fiber reinforced polymers composites (FRPC).

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

Adhesives: Introduction, properties and applications of epoxy resin

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

Self Study: Introduction, structural properties and applications of cellulose and lignin.

PRACTICAL CONTENT**List of Experiments*****UNIT-I : Compulsorily conducting experiments***

1. Estimation of total hardness of water by EDTA method
2. Potentiometric estimation of FAS using $K_2Cr_2O_7$

3. Determination of pKa 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)

UNIT-II: 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

UNIT-III: Open Ended Experiments (any one)

1. Measurements of IV characteristics of Photovoltaic Cell
2. Determination of percentage of copper in present the brass solution.
3. Determination of CaO in cement solution
4. Determination of manganese dioxide in pyrolusite ore

Reference books:

1. Wiley (2013), Engineering Chemistry (2nd Edn.), Wiley India Pvt. Ltd. New Delhi.
2. Satyaprakash & Manisha Agrawal (2012), Engineering Chemistry (1st edition), Khanna Book Publishing, Delhi.
3. Shashi Chawla (2003), A Text Book of Engineering Chemistry (3rd edition), Dhantpat Rai & Co. Pvt., Pub. Delhi.
4. Bahl.B.S., Arun Bahl & Tuli.G.D (2010), Essentials of Physical Chemistry (1st edition), S.Chand Publishing.
5. Sunita Rattan (2011), Applied Chemistry (3rd edition), S.K. Kataria & Sons.
6. Dr. Chinnappan Baskar, Dr.Shikha Baskar & Dr.Ranjit S.Dhillon (2012), Engineering Chemistry (1st edition), Wiley India Pvt. Ltd.
7. Gourkrishna Dasmohapatra (2017), Engineering Chemistry (4th edition), Vikas Publishing
8. Dhara.S.S. & Umare.S.S (2010), Engineering Chemistry (12th edition), S. Chand & Company Ltd., Delhi.
9. Gadag R.V. and Nityananda Shetty (2016), A Text Book of Engineering Chemistry (2nd edition), I.K.International Publishing house.
10. Billmeyer.F.W. (1999), Text Book of Polymer Science (4th edition), John Wiley & Sons.
11. Ozin.G.A. & Arsenault.A.C. (2005), Nanotechnology A Chemical Approach to Nanomaterials (2nd edition), RSCPublishing.
12. Fontana.M.G., Greene.N.D. (1996), Corrosion Engineering (3rd edition), McGraw Hill Publications, New York.
13. Kirby W. Beard (2019), Linden's Handbook of Batteries (5th Edn.), McGraw Hill.

14. Takatoshi Tsujimura (2012), OLED Display Fundamentals and Applications (2nd edition), Wiley–Blackwell
15. Dr. Panda H. (2017), “Handbook on Electroplating with Manufacture of Electrochemicals” (1st edition), Asia Pacific BusinessPress Inc.
16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: TheNational Academies Press. doi: 10.17226/4782.
17. Laboratory Manual, Department of Chemistry, BEC Bagalkot.
18. Dr. Sudha Rani (1998), Laboratory Manual on Engineering Chemistry (1st edition), DhanapathRai Publishing Co. Ltd

Web links and Video Lectures (e-Resources):

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

Course Outcomes:

CO1: Able to evaluate quality of water and its treatment methods for domestic and industrial applications..

CO2: Identify and evaluate composition of materials and mechanism involved in corrosion with controlling measures.

CO3: Outline the application of structural materials for engineering application.

CO4: 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	2										1
CO3	3	2										1
CO4	3	1					1					1

22UME223C	Computer Aided Engineering Drawing	03 - Credits
Hrs./Week: 2 :0: 2		CIEMarks:50
Total Hours: 40Hrs (28T +12P)		SEEMarks:50

UNIT-I		10Hrs.						
<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		10Hrs.						
<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		10 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		10Hrs.						
<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>								
<p>Scheme of Examination</p> <p style="text-align: center;">CIE- Continuous Internal Evaluation - Theory (Using grid sheet)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">CIE</th> <th style="width: 35%;">Max Marks</th> <th style="width: 50%;">Reduced Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">I</td> <td style="text-align: center;">40 Marks</td> <td style="text-align: center;">20 Marks</td> </tr> </tbody> </table>			CIE	Max Marks	Reduced Marks	I	40 Marks	20 Marks
CIE	Max Marks	Reduced Marks						
I	40 Marks	20 Marks						

II	40 Marks	20 Marks
	Assignment	10 Marks
Reduced to 50% of Marks		25 Marks

CIE - Continuous Internal Evaluation - Practical (Lab print outs)

Particulars	Max Marks	Reduced Marks
Lab classes (using sketch book and print outs)	30 Marks	15 Marks
Lab CIE	20 Marks	10 Marks
		25 Marks

Total Marks: C I E (Theory + Practical)

Theory (Using grid sheet)	Practical	Total
25 Marks	25 Marks	50 Marks

SEMESTER END EXAMINATION

The Lab-SEE of three hours is conducted as per the model question paper for 100 marks and scaled down to 50 Marks. 50% weightage for sketch and 50% weightage for printouts in both CIE and SEE.

QUESTION PAPER FORMAT AWARD OF MARKS

Q. No.	Question	Marks
1	Straight lines OR Planes	30 Marks
2	Solids	40 Marks
3	Development of Surfaces OR Isometric Projections	30 Marks
	Total Marks	100 marks

Q.No	Solutions & Sketching on Grid Sheets	Computer display & Printout	Total
1	50% (15 Marks)	50% (15 Marks)	100% (30 Marks)
2	50% (20 Marks)	50% (20 Marks)	100% (40 Marks)
3	50% (15 Marks)	50% (15 Marks)	100% (30 Marks)

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											
	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		1	3		1
CO5	3	2			3	1				3		1

22UME122N /22UME222N	Introduction To Mechanical Engineering	03-Credits
Hrs./Week: 3 :0: 0		CIEMarks:50
Total Hours: 40Hrs		SEEMarks:50

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. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rdEd., 2003.
3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017
4. Robotics, AppuKuttan KK K. International Pvt Ltd, volume 1
5. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A Practical Approach", ETI Labs
6. Raj kamal, "Internet of Things: Architecture and Design", McGraw hill.
7. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
8. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012

Course Outcomes:

CO1: Explain the role of Mechanical Engineering w.r.t 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	1	1	-	2	-	-	-	-	1	-	-	1
CO2	1	2	1	-	-	-	-	-	-	1	-	1
CO3	1	2	1	-	-	-	-	-	-	1	-	1
CO4	1	1	-	-	2	-	-	-	-	1	-	1

22UEE216N /22UEE216N	Introduction to Electrical Engineering	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

1. To study the basics of DC, single phase & three phase circuits and electrical earthing
2. To Illustrate the laws of DC circuit, concepts of single phase & three phase AC circuits, domestic wiring practices and electricity generation principles, construction-working principle-applications of electrical machines & transformers
3. To apply circuit laws and concepts to calculate different parameters of DC circuits, single phase & three phase AC circuits
4. To evaluate the emf induced in generators & transformers under given conditions and assess energy consumption in domestic loads

UNIT – I	(10 Hours)
<p>Introduction: General structure of electrical power systems using single line diagram approach. Power Generation: Hydel, thermal, nuclear power plants (block diagram approach). DC Circuits: Ohm’s law and its limitations, KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.</p>	
UNIT – II	(10 Hours)
<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). 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 Hours)
<p>DC Generator, DC Motor, Transformers: Working principle, construction, equations, types and classifications, specifications, applications, cost. Simple numerical.</p>	
UNIT – IV	(10 Hours)
<p>Domestic Wiring: Requirements, Types of wiring, Two way and three way control of loads. Electrical Energy Calculation: Power rating of household appliances, two-part electricity tariff, calculation of electricity bill for domestic consumers. 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>	
<p>Reference books:</p> <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”, 2nd Edition, PHI Learning, 2009 5. V.N.Mittle & 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 Mapping Table

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	03-Credits
Hrs/Week: 3:0:0		CIE Marks:50
Total Hours: 40Hrs		SEE Marks:50

Course Objectives:

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, Multivibrators, Single-stage astable 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. (Text 1)</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:

1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015.
2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-84.
3. D P Kothari, I J Nagrath, 'Basic Electronics', 2nd edition, McGraw Hill Education (India), Private Limited, 2018

Course Outcomes:

A student who successfully completes this course should 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

22UCS220N	Introduction to C Programming	03-Credits
Hrs/Week: 2:0:2		CIE Marks:50
Total Hours: 40Hrs (28T+12P)		SEE Marks:50

Course Objectives:

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	08 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, <i>?:</i> 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	08 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 and Unions: Defining a structure, Declaring structure variables, Accessing structure members, Initialization, Arrays of structure, Structures and Functions.</p>	

22UCS230B	Introduction to Web Programming (Integrated)	Credits: 03
Hrs/Week: 2:0:2		CIE Marks: 50
Total Hours/Week: 40 Hrs (28 T+12 P)		SEE Marks: 50

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	08 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 HTML5 CSS and JavaScript (First Edition), Jones & Bartlett Learning. 3. Chris Bates, WEB PROGRAMMING (Second Edition), Wiley. 	
Programming Assignments:	
<ol style="list-style-type: none"> 1. Create an XHTML page to demonstrate the usage of Text Formatting tags, Links, Images, 2. Create a table using XHTML tags. Properly align cells, give suitable cell padding And cell spacing, and apply background color, bold and emphasis necessary 3. Demonstrate the HTML5 Semantic tags for a webpage. 4. Develop and demonstrate the usage of inline and internal style sheet using CSS. 5. Create a simple calculator interface with HTML and CSS 6. Create a web page using HTML and CSS with tabular layout 	

22UCS231B	Introduction to Python Programming	03-Credits
Hrs/Week: 2:0:2		CIE Marks:50
Total Hours: 40Hrs (28T+12P)		SEE Marks:50

Course Objectives:

1. Learn the syntax and semantics of the Python programming language.
2. Illustrate the process of structuring the data using lists, tuples, strings, and dictionaries
3. Demonstrate the use of built-in functions to navigate the file system.

UNIT – I	08 Hrs
<p>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</p> <p>Python control structures: Getting started with programs, decisions, loops, terminating control</p>	
UNIT – II	06 Hrs
<p>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</p> <p>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</p> <p>Introduction to sets: Creating sets, Accessing set elements, Iterating through set elements.</p>	
UNIT – III	06 Hrs
<p>Strings: Conversion from and to strings, searching in strings, splitting strings, joining strings, modifying strings, padding strings</p> <p>Dictionaries: Creating Dictionaries, accessing Dictionary elements, counting Dictionary elements, Iterating through Dictionary elements, searching elements within Dictionaries, adding and deleting Dictionary, comparison simple programs.</p>	
UNIT – IV	08 Hrs
<p>Functions: Introduction to functions, function definitions, function call, positional arguments, default arguments, keyword arguments, variable arguments, returning from functions,</p> <p>Files: Introduction to file handling, opening and closing files, reading from text files, writing to text files, seeking within files, reading to binary files, wring to binary files.</p> <p>Programming Exercises:</p> <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. b.Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not. <ol style="list-style-type: none"> a. Develop a program to generate Fibonacci sequence of length(N). Read N from the console. 	

- b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
 4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
 5. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use 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]
 6. 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()].
 7. 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.
 8. 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.
 9. 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
 10. Given price list: { item1: amt, item2: amt . . . } and list of items purchased, write python program to find amount to be paid for purchased items.

Ex: pricelist ; { "pen":10, "Notebook":50, "book":100}
 Items_purchased = ["pen", "book"]
 o/p: amt_to_be_paid = 110

Reference books:

1. B. Nagesh Rao, Learning PythonCyberplus publication, 2nd edition
2. Gaowrishankar S., Veena A, Introduction to python programmingCRC press
3. Al Sweigart, Automate the boring stuff with Python, No strarch press, Automate the boring stuff with Python, No strarch press

Course Outcomes:

CO1: Explain the syntax and semantics of different statements and functions.

CO2: Demonstrate the use of strings, files, lists, tuples, dictionaries and exceptions

CO3: Develop the solution to a given problem by selecting appropriate data types and modules

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

22UCS232B	Basics of Java Programming	03-Credits
Hrs/Week: 2:0:2		CIE Marks:50
Total Hours: 40Hrs (28 T+12 P)		SEE Marks:50

Course Objectives:

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	08 Hrs
<p>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</p> <p>Text book 1: Ch 2, Ch 3</p>	
UNIT – II	06 Hrs
<p>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.</p> <p>Text book 1: Ch 4, Ch 5</p>	
UNIT – III	06 Hrs
<p>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</p> <p>Text book 1: Ch 6, Ch 7 (7.1-7.9)</p>	
UNIT – IV	08 Hrs
<p>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.</p> <p>Text book 1: Ch 8</p>	

Reference books:

Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Web links and Video Lectures (e-Resources):

- https://onlinecourses.nptel.ac.in/noc22_cs47/preview

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

Programming Exercises:

1. Develop simple java programs to demonstrate the use of conditional statements
2. Develop simple java programs to demonstrate the use
 - i) loop statements

ii) Reading & printing different data types in java

3. Develop simple java programs on 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
10. Develop simple java programs to demonstrate Method overloading & overriding

Course outcomes:

At the end of the course student will be able to

CO1: Explain the object-oriented concepts and other features of JAVA.

CO2: Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO3: Demonstrate the concepts of polymorphism, inheritance and other features of JAVA.

CO4: Write Java application programs using OOP principles and proper program structuring.

CO5: Design and develop standalone applications using Java.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
No POs -COs															
The students will be able to:															
CO1	3	2													
CO2	3	3											2		1
CO3	3	3		2									3	2	2
CO4	3	3		2									3	3	3
CO5	3	3		3									3	3	3

22UCS233B	Introduction to C++ Programming	03-Credits
Hrs/Week: 2:0:2		CIE Marks:50
Total Hours: 40Hrs (28T+12P)		SEE Marks:50

Course Objectives:

1. Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object.
2. Understand the concept of struct and 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. 	
Web links and Video Lectures (e-Resources):	
<ol style="list-style-type: none"> 1. Basics of C++ - https://www.youtube.com/watch?v=BCIS40yzssA 2. Functions of C++ - https://www.youtube.com/watch?v=p8ehAjZWjPw 	
Tutorial Link: 1. https://www.w3schools.com/cpp/cpp_intro.asp	
2. https://www.edx.org/course/introduction-to-c-	
Programming Assignments:	
<ol style="list-style-type: none"> 1. 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 Struct. 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. Read and display the contents..
 7. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data member
 8. Program to illustrate default constructor, parameterized constructor
 9. Develop simple C++ programs to demonstrate Inheritance concept
 10. Suppose we have three classes Vehicle, Four Wheeler, and Car. The class Vehicle is the base class, the class Four Wheeler is derived from it and the class Car is derived from the class Four Wheeler. Class Vehicle has a method 'vehicle' that prints I am a vehicle, class Four Wheeler has a method 'four Wheeler' that prints I have four wheels, and class Car has a method 'car' that prints I am a car .So, as this is a multi-level inheritance; we can have access to all the other classes methods from the object of the class Car. We invoke all the methods from a Car object and print the corresponding outputs of the methods.
So, if we invoke the methods in this order, car(), four Wheeler(), and vehicle(), then the output will be
I am a car
I have four wheels
I am a vehicle

Course Outcomes:

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

CO1: Demonstrate the basic concept of programming.

CO2: Able to understand and design the solution to a problem using struct, function and function overloading concepts.

CO3: Able to understand and design the solution to a problem using object-oriented programming concepts.

CO4: Develop programs using inheritance and polymorphism.

22UHS224C:	Professional Writing Skills in English	01-Credit
Hrs/Week: 1:0:0		CIE Marks:50
Total Hours:15Hrs		SEE Marks:50

Course Objectives:

The course Professional Writing Skills in English will enable the students,

1. To Identify the Common Errors in Writing and Speaking of English.
2. To Achieve better Technical writing and Presentation skills for employment.
3. To read Technical proposals properly and make them to write good technical reports.
4. To Acquire Employment and Workplace communication skills.
5. To learn about Techniques of Information Transfer through presentation in different level.

UNIT - I	3 Hrs
<p>Identifying Common Errors in Writing and Speaking of English: Common errors 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.</p>	
UNIT – II	4 Hrs
<p>Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, 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.</p> <p>Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises.</p>	
UNIT - III	4 Hrs
<p>Technical Reading and Writing Practices: Introduction to Technical writing process, Effective Technical Reading and Writing, Introduction to Technical Reports writing, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals. Scientific Writing & It's Process.</p> <p>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.</p>	
UNIT - IV	4 Hrs
<p>Professional Communication for Employment: Preparation of Job Application, Components of Letter Writing, Formats and Types of official, employment, Business Letters, Resume vs Bio Data, Profile & CV. Writing types of resume, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos. Presentation skills and Formal Presentations by Students.</p> <p>Professional Communication at Workplace: Group Discussion – Importance, Characteristics, Strategies of Group Discussions. Employment/ Job Interviews. Non-Verbal Communication Skills.</p>	

Reference books:

1. Professional Writing Skills in English, Infinite Learning Solutions – (Revised Edition) 2022.
2. Functional English (As per AICTE 2018 Model Curriculum) Cengage learning India Pvt. Ltd. [Latest Revised Edition] - 2020.

