BANGALORE UNIVERSITY

SCHEME AND SYLLABUS: CBCS - 2021

(As per NEP 2020)

Scheme of Teaching and Examination

For I Semester and II Semester B.Tech

(Common to all Programmes except B.Arch)

UNIVERSITY VISVESVARAYA COLLEGE OF ENGINEERING

K R Circle, Bengaluru-560 001.

Bangalore University

University Visvesvaraya College of Engineering

Scheme of Teaching and Examination for I / II Semester B.Tech CBCS 2021 (Common to all B.Tech Programmes)

Physics Cycle

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours / Week				Examination				Credits
					L	T	P	SS	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1.	BS	21BSEM101 / 21BSEM201	Engineering Mathematics – I (I Sem) / Engineering Mathematics – II (II Sem)	Mathematics	02	02	00	00	03	50	50	100	03
2.	BS	21BSEP102	Engineering Physics	Physics	02	02	00	00	03	50	50	100	03
3.	ES	21ESEE103	Electrical Engineering Sciences	Electrical	02	02	00	00	03	50	50	100	03
4.	ES	21ESEM104	Engineering Mechanics	Civil	02	02	00	00	03	50	50	100	03
5.	ES	21ESEG105	Engineering Graphics	Mechanical	02	00	03	00	04	50	50	100	03
6.	BS	21BSEPL106	Engineering Physics Laboratory	Physics	00	00	03	00	03	50	50	100	01
7.	ES	21ESEEL107	Electrical Engineering Laboratory	Electrical	00	00	03	00	03	50	50	100	01
8.	HS	21HSCE108	Communicative English & Technical Writing	English	01	02	00	00	03	50	50	100	02
9.	AE	21AEMC109	Media Presentation & Regulations	Communication	00	02	00	00	02	50	50	100	01
				Total	**11**	**12**	**09**	**00**	**27**	**450**	**450**	**900**	**20**

Chemistry Cycle

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours / Week				Examination				Credits
					L	T	P	SS	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1.	BS	21BSEM101 / 21BSEM201	Engineering Mathematics – I (I Sem) / Engineering Mathematics – II (II Sem)	Mathematics	02	02	00	00	03	50	50	100	03
2.	BS	21BSEC110	Engineering Chemistry	Chemistry	02	02	00	00	03	50	50	100	03
3.	ES	21ESPP111	Programming for Problem Solving	Computer Science	02	02	00	00	03	50	50	100	03
4.	ES	21ESPE112	Principles of Electronics	Electronics	02	02	00	00	03	50	50	100	03
5.	ES	21ESME113	Mechanical Engineering Sciences	Mechanical	02	02	00	00	03	50	50	100	03
6.	BS	21BSECL114	Engineering Chemistry Laboratory	Chemistry	00	00	03	00	03	50	50	100	01
7.	ES	21ESPPL115	Programming for Problem Solving Laboratory	Computer Science	00	00	03	00	03	50	50	100	01
8.	ES	21ESWS116	Workshop Practice	Mechanical	01	00	03	00	03	50	50	100	02
9.	AE	21AEDI117	Design Thinking & Innovation*	Any Engg. Dept.	00	02	00	00	02	50	50	100	01
				Total	**11**	**12**	**09**	**00**	**26**	**450**	**450**	**900**	**20**

* - Question Paper will be set by Mechanical Engineering Department.

One-Week Induction Program to be conducted immediately after the admission to I semester B.Tech. Programme. Attendance compulsory, Credit – 0.

CHOICE BASED CREDIT SYSTEM (CBCS) 2021

(As per NEP 2020)

Scheme and Syllabus of Teaching and Examination

For I Semester and II Semester B.Tech

(Common to all Programmes except B.Arch)

Table of Contents

BANGALORE UNIVERSITY

Department of Mathematics, UVCE, Bengaluru.

Scheme and Syllabus - CBCS – 2021

Course Title	**Engineering Mathematics – I**					
Course Code	**21BSEM101**					
Category	Basic Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Obtain the n^{th} derivative of a function and study the problems on polar curves.
2. Study the applications of Taylor's and Maclaurin's theorems and the concept of maxima and minima and also sketch the curves.
3. Be skilled in computations and applications of infinite series and sums and analyze the nature of the given series.
4. Be able to solve the linear algebraic equations and compute eigen values and eigen vectors.
5. Apply the concept of partial differentiation, determine Jacobians, gradient, curl, and divergence of the problems which appear in engineering problems.

UNIT 1 **10 Hours**

Calculus - I: n^{th} derivative of standard functions, Leibnitz's theorem and problems. Polar curves-angle between the radius vector and the tangent, the angle between two curves, pedal equation. Curvature and radius of curvature - cartesian and polar forms, center and circle of curvature-evolutes, singular points, asymptotes, and involutes**.**

UNIT 2 **10 Hours**

Calculus - II: Taylor's and Maclaurin's expansion for single and two-variable functions and applications. Indeterminate forms - evaluation of limits by L'Hospital's rule. Maxima and minima for single and two-variable functions. **Curve Tracing** - General rules to trace Cartesian, polar and parametric curves.

UNIT 3 **10 Hours**

Sequence and Series: Convergence of sequence and series, tests for convergence- ratio test, Raabe's test, Cauchy's test, Root test, Integral test; absolute and conditional convergence; Leibnitz's test; Summation of binomial, exponential, and logarithmic series; Power series, Taylor's series, series for exponential, trigonometric and logarithmic functions.

UNIT 4 **10 Hours**

Matrices: Elementary transformations- Rank and inverse of a matrix, solution of the system of linear equations. Orthogonal matrices; eigen values and eigen vectors of the matrix; Cayley-Hamilton theorem; Diagonalisation of square matrices. Quadratic forms, reduction to canonical form by orthogonal transformation**.**

UNIT 5 **10 Hours**

Multivariable Calculus (Differentiation): Partial derivatives-Euler's theorem (without proof) and problems; total and implicit derivatives; evaluation of Jacobian; Gradient, curl, and divergence-problems**.**

TEXT BOOKS

1. B. S. Grewal ,"Higher Engineering Mathematics", Khanna publishers, 44th edition, 2017.
2. E. Kreyszig, "Advanced Engineering Mathematics"-Wiley, 2019.

REFERENCE BOOKS

1. B. V. Ramana "Higher Engineering Mathematics" Tata McGraw - Hill, 2006.
2. N. P. Bali and M. Goyal, "A Textbook of Engineering Mathematics", Laxmi publications, latest edition.
3. H. K Dass and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Publishing, 1st edition, 2011.

EBOOKS / ONLINE RESOURCES

1. http://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
2. https://ocu.mit.edu/courses/mathematics/18-06-linear-algebra-spring- 2010/vidoe-lectures/(Gilbert Strang vedio lectures)
3. http://nptel.ac.in/downloads/122101003(lecturenotes)
4. https://math.buet.ac.bd/public/faculty-profile/files/766768001.pdf

MOOCs

1. http://nptel.ac.in
2. http://academicearth.org

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Apply the knowledge of calculus to find the n^{th} derivative of a function and solve problems related to polar curves and their applications in determining the bendness of a curve.

CO2: Analyze the behavior of functions in terms of attaining extremum values and the geometrical interpretation of functions and their curves.

CO3: Compute infinite series, sum an infinite series, analyze the nature of the given series.

CO4: Solve linear algebraic equations, compute eigen values and eigenvectors and diagonalize the square matrix.

CO5: Use partial differentiation; determine Jacobians, gradient, curl and divergence, etc.

SCHEME OF EXAMINATION

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			
There shall be 10 questions • Two full questions to be set from each unit with internal choice. ✓ Minimum number of sub questions : 2 ✓ Maximum number of sub questions : 3 • Each full question shall be for a maximum of 20 marks. • Answer any *Five* full questions choosing at least One full question from each unit.			

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H	M										L
CO2	H	M										L
CO3	H	M										L
CO4	H	M										L
CO5	H	M										L

L – Low, M – Medium, H – High

Course Title	**Engineering Physics**					
Course Code	**21BSEP102**					
Category	Basic Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Make students learn and understand basic concepts and principles of physics to analyse and solve various types of Physical problems.
2. Learn the theory of vibrations and to understand the concept of elasticity.
3. Understand the concept of electrical conductivity in solids and semiconductors.
4. Study the Magnetic and Dielectric properties of Solids.
5. The concept of different phenomenon in optics will be studied.

UNIT 1 **10 Hours**

Physics of Vibrations: Free oscillations- differential equation and solution; Damped vibrations - differential equation and solution - critical, over and under damping, Forced vibrations - differential equation and solution, example of forced vibrations, Resonance - amplitude and velocity resonance, sharpness of resonance, problems**. Elasticity:** Introduction - Definition of Elastic moduli and Poisson's ratio, Statement of Hook's law, Torsional Pendulum, Bending of Beam - Bending Moment, Cantilever Experiment to determine Young's Modulus, problems.

UNIT 2 **10 Hours**

Electrical Conductivity in Solids: Review of Classical free electron theory-Expression for electrical conductivity in metals, Density of States and Carrier Concentration in Metals. Expressions for thermal conductivity in metals, Wiedemann-Franz law, Limitations of free electron theory. Problems. **Introduction to Semiconductors**: Intrinsic Semiconductors with examples, Fermi level in intrinsic semiconductors, Extrinsic Semiconductors, n-type and p-type semiconductors with examples, Law of mass action, charge carrier density in extrinsic & intrinsic semiconductors. Problems

UNIT 3 **10 Hours**

Magnetic Materials: Magnetism, Classification of magnetic materials and their properties, Ferrromagnetic materials – concept of domain, B-H curve, Hysteresis loss, Hard and Soft magnetic materials - Properties and applications. Problems. **Dielectric Materials:** Introduction, Types of polarization & expression for total polarization, Clausius-Mossotti equation, Ferroelectric Materials- Properties and applications of dielectric materials.

UNIT 4 **10 Hours**

Interference: Principle of superposition, conditions for interference, Newton rings- condition for bright and dark rings, problems**. Interference in Thin Films:** Theory of interference fringes, Determination of the thickness of a thin paper strip using air-wedge. **Diffraction:** Definition & condition for Diffraction, two kinds of diffraction & its explanation with diagram, Difference between interference and diffraction, problems.

UNIT 5 **10 Hours**

Lasers: Spontaneous and stimulated emission, population inversion, construction and working of Helium-Neon and semiconducting laser, applications of lasers, problems**.** **Optical Fibres:** Mechanism of light transmission in optical fibre, derivation of expression for numerical aperture and acceptance angle, types of optical fibres, loss mechanisms in optical fibres, applications of optical fibres, problems. **Holography:** Fundamentals of holography, difference between photography and holography, construction of hologram, applications of holography.

TEXT BOOKS

1. R K Gaur and S L Gupta, Engineering Physics, Dhanpat Rai Publications, Revised edition 2011.
2. M N Avadhanulu, P G Kshirasagar, A Text Book of Engineering Physics, S. Chand Company Private Limited. Revised Edition 2015.
3. Ajay Ghatak, Optics, McGraw Hill Education (India) Private Limited, 5th Edition, 2012.
4. S P Basavaraju, Engineering Physics, Subhas Publications, 1998 & CBCS syllabus, Subhas Publications, 2016.
5. Srinivasan M R, Physics for Engineers,New Age International 2009.

REFERENCE BOOKS

1. Halliday, Resnick & Walker, Fundamentals of Physics, John Wiley & Sons, 2010.
2. Hitendra K Malik and A K Singh, Engineering physics, Tata McGraw Hill
3. Education private Limited, 2009.
4. Sears and Zemansky, University Physics with modern physics, 13th Edition, University Press.
5. H D Young and R A Freedman, University Physics, 13 Edition, Pearson.

EBOOKS / ONLINE RESOURCES

1. M N Avadhanulu, A Textbook of Engineering Physics,S. Chand Publishing, 1992, https://books.google.co.in/books?id=lTUNWOR_cDgC
2. Dattu R Joshi, Engineering Physics, Tata McGraw-Hill Education, 2010. https://books.google.co.in/books/about/Engineering_Physics.
3. V Rajendran, Engineering Physics, Tata McGraw-Hill Education, https://books.google.co.in/books/about/Engineering_Physics.html?id=KsXTNUCuby0C
4. Mahesh C Jain, Engineering Physics, PHI Learning Pvt. Ltd., 2009, https://books.google.co.in/books/about/Textbook_Of_Engineering_Physics.html?id=wKeDYbTuiPAC&redir_esc=y

MOOCs

1. http://nptel.ac.in/courses/122107035/

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Apply the physics concepts relevantly and appropriately where ever required.

CO2: Understand the concept of theory of vibrations which helps to set up and solve differential equations related to the situation and the knowledge of elasticity that can be applied in different branches of Engineering.

CO3: The structure of solids will be understood by knowing the concept of electrical conductivity and the knowledge of semiconductor that can be implemented in many day to day applications.

CO4: The mechanical properties of the materials will be understood by learning the concept of magnetic and dielectric properties using which strength of the materials can be analyzed.

CO5: The importance of the Physics of Optics is significant in various fields of Science and Technology.

SCHEME OF EXAMINATION

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			

There shall be 10 questions

- Two full questions to be set from each unit with internal choice.
  - ✓ Minimum number of sub questions : 2
  - ✓ Maximum number of sub questions : 3
- Each full question shall be for a maximum of 20 marks.
- Answer any *Five* full questions choosing at least One full question from each unit.

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	L	M										
CO2	L	M										
CO3	L	M										
CO4	L	M										
CO5	L	M										

L – Low, M – Medium, H – High

Course Title	**Electrical Engineering Sciences**					
Course Code	**21ESEE103**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Acquire knowledge of fundamental concepts of electrical engineering in DC circuits.
2. Acquire knowledge of fundamental concepts of electrical engineering in AC circuits.
3. Expose the students to the various AC and DC machines.
4. Familiarize equipment which are used in domestic and industrial applications.
5. Familiarize the Electrical installation components, wiring and measuring instruments.

UNIT 1 **10 Hours**

DC Circuits: Ohm's law, KCL, KVL, Mesh & Nodal analysis- independent sources with resistive network. superposition, Thevenin's Theorem, Maximum Power Transfer theorem, Star-delta transformation**.**

UNIT 2 **10 Hours**

AC Circuits: Response of R-L, R-C & R-L-C circuits to sinusoidal excitation, Analysis of R-L & R-C series & parallel circuit with simple numericals, Advantages of 3-phase circuit, Star & Delta connection, vector diagram, relation between phase & line quantities and power (excluding numericals), Measurement of three phase power with one and two wattmeter method for balanced load.

UNIT 3 **10 Hours**

DC Machines and Induction Motor: Construction of DC machine, working principle of DC generator, EMF equation. Significance of back EMF, torque equation of DC motor, characteristics-OCC of DC shunt generator, performance characteristics of DC series & shunt motor, Application of DC machines. Construction & working principle of three phase induction motor, concept of Rotating magnetic field, concept of slip, simple numerical on slip & speed, torque-slip characteristics and applications.

UNIT 4 **10 Hours**

Transformers and Alternators: Construction & working principles of single phase transformer, EMF equation, equivalent circuit, losses in transformers, pre-determination of efficiency & regulation. Numerical on EMF equation, losses, regulation & efficiency. Alternator: construction & working principles, EMF equation and simple numerical on EMF equation (excluding K_c & K_d)**.**

UNIT 5 **10 Hours**

Power generation and Electrical Installations: Block diagram of hydel, thermal, nuclear, solar, and wind power generation, Switches, Fuse, MCB, ELCB, Types of Wires and Cables, Earthing of electrical equipments, Measuring Instruments: Types of AC & DC meters, Dynamometer type wattmeter, energy meter & Megger. Block diagram of Digital meter**.**

TEXT BOOKS

1. Dr. E. G. Shivakumar, "Basic Electrical Engineering", YESDEE Publications, 2018.
2. D.P. Kothari and I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. Ritu Sahdev, "Basic Electrical Engineering", Khanna Publishers, 2019.

REFERENCE BOOKS

1. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
2. Raina & Bhattacharya, "Electrical Design Estimating and Costing", New Age International, 2019.

EBOOKS / ONLINE RESOURCES

1. http://nptel.ac.in/courses/108105053/
2. https://books.google.com/books?isbn=812192405
3. http://hptel.ac.in/courses/108108076

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Understand the fundamental concepts of Electrical DC circuits.
CO2: Understand the fundamental concepts of Electrical AC circuits.
CO3: Usage of Electrical DC machines and AC machines.
CO4: Usage of Transformer and Alternators.
CO5: Understanding the concept of electrical power generation and measuring instruments.

SCHEME OF EXAMINATION

<table>
<tr><th colspan="4">CIE - 50 Marks</th></tr>
<tr><td colspan="2">Unit I, II & III</td><td colspan="2">Unit IV & V</td></tr>
<tr><td>Test I</td><td>AAT I</td><td>Test II</td><td>AAT II</td></tr>
<tr><td>20 Marks</td><td>05 Marks</td><td>20 Marks</td><td>05 Marks</td></tr>
<tr><td colspan="4">SEE - 20 * 5 = 100 Marks
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• Two full questions to be set from each unit with internal choice.
✓ Minimum number of sub questions : 2
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• Each full question shall be for a maximum of 20 marks.
• Answer any Five full questions choosing at least One full question from each unit.</td></tr>
</table>

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H		M									
CO2	H		M									
CO3	M											
CO4	M											
CO5	L		L									

L – Low, M – Medium, H – High

Course Title	**Engineering Mechanics**					
Course Code	**21ESEM104**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. The course aims in understanding the laws and principles of engineering mechanics to field problems.
2. Basic introduction to both statics and dynamics principles will be dealt.
3. Topics on resultant and equilibrium of coplanar force system, Analysis of trusses, Friction, Centroid and Moment of Inertia of plane areas, kinetics, work and energy are dealt.
4. An understanding of the assumptions and limitations of the approaches used.
5. The ability to analyze and solve simple problems in mechanics.

UNIT 1 **10 Hours**

Resultant of Coplanar Force System: Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment , Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar parallel force system, Resultant of coplanar non - concurrent force system, Problems on engineering applications**.**

UNIT 2 **10 Hours**

Equilibrium of Coplanar Force System: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non - concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Problems on engineering applications.

UNIT 3 **10 Hours**

Analysis of Trusses and Friction: Analysis of Trusses - Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Problems on engineering applications. **Friction -** Theory of friction, laws of dry friction, equilibrium of block on horizontal plane, equilibrium of block on inclined plane, analysis of ladder friction, analysis of wedge friction, Problems on engineering applications.

UNIT 4 **10 Hours**

Centroid and Moment of Inertia of Plane Areas: **Centroid of Plane Areas -** Locating the centroid of rectangle, triangle, semicircle, quadrant of a circle and sector of a circle using method of integration, centroid of composite areas and simple built-up sections, Problems on engineering applications. **Moment of Inertia of Plane Areas -** Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections, Problems on engineering applications**.**

UNIT 5 **10 Hours**

Kinetics and Work Power & Energy: Kinetics - D'Alembert's principle of dynamic equilibrium, kinetics of curvilinear motion on horizontal plane. Banking and super elevation, Design speed, maximum speed, minimum speed, motion on level circular path and motion on banked circular path, Problems on engineering applications. **Work, Power and Energy -** Work done by a force, Work done by a spring, Power, Potential energy, Kinetic energy, Work-energy equation, Virtual work, Principles of virtual work, Problems on engineering applications**.**

TEXT BOOKS

1. Engineering Mechanics by S.S Bhavikatti, New Age International Publishes, Seventh edition, 2019.
2. Engineering Mechanics by R.K. Bansal, Laxmi Publications, 2006.

REFERENCE BOOKS

1. Engineering Mechanics by Ramamrutham S, UBS Publishers, 2016.
2. Mechanics for Engineers by Beer and Johnston, McGraw HilolBook Company Inc, New York.
3. Engineering Mechanics by Timoshenko and Young, 5thEdn, McGraw India, 2013.
4. Schaum's outline of Engineering Mechanics by E.Nelson, 6thEdn, McGraw Hill, US, 2011.
5. Engineering Mechanics – Statics and Dynamics by Irving H Shames and G Krishna Mohan Rao, 4th Edition, Pearson Education, 2006.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: The concept and behaviour of forces, moments of forces on rigid bodies, Resultant of equilibrium of force system.
CO2: Analysis of trusses and Resistance to applied forces for different conditions.
CO3: Properties of area of different geometrical figures and engineering sections.
CO4: Perception of bodies under motion.
CO5: Application of energy principles to engineering problems.

SCHEME OF EXAMINATION

<table>
<tr><th colspan="4">CIE - 50 Marks</th></tr>
<tr><td colspan="2">Unit I, II & III</td><td colspan="2">Unit IV & V</td></tr>
<tr><td>Test I</td><td>AAT I</td><td>Test II</td><td>AAT II</td></tr>
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• Two full questions to be set from each unit with internal choice.
✓ Minimum number of sub questions : 2
✓ Maximum number of sub questions : 3
• Each full question shall be for a maximum of 20 marks.
• Answer any Five full questions choosing at least One full question from each unit.</td></tr>
</table>

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H	M										
CO2	H	H	M									
CO3	H	H	M									
CO4	M	H	M									
CO5	H	H	M									

L – Low, M – Medium, H – High

Course Title	**Engineering Graphics**					
Course Code	**21ESEG105**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	00	03	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 04 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Expose the students to learn the basics of communication of Engineering drawings as per BIS convention.
2. Provide basic principle and various aspects of Engineering Drawing that involves learning of orthographic projection of various two dimensional (2D) and three dimensional (3D) geometry primitives in two dimensions.
3. Apply the basics of surface and solid geometry to view the sectional details.
4. Apply the principles of isometric projection and represent the objects in three dimensions based on orthographic projection and vice versa.

UNIT 1 **10 Hours**

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance, B.I.S. conventions for Engineering Drawing; lettering, Dimensioning, Use of instruments, Concept of R.F. (Representative Fraction) in scales**. Projections of Points:** Concept of Orthographic projection, Projection of points in different quadrants. **Projection of Straight Lines:** Projection of lines in simple Positions, inclined to one plane and parallel to other plane, inclined to both planes, problems on true length and true inclinations, Simple practical problems.

UNIT 2 **10 Hours**

Projections of Plane Surfaces: Constructions of polygons, Projection of right regular plane surfaces: triangle, square, rectangle, pentagon, hexagon and circle (without through holes).

UNIT 3 **10 Hours**

Projections of Solids: Projection of simple and right regular solids: Prisms, Pyramids, Cone and Cylinder (without through holes).

UNIT 4 **10 Hours**

Sections of Solids: principles of Section plane and Section points, Drawing the sectional views and the true shape of section of right regular solids viz. Prisms, Pyramids, Cone and Cylinder resting on their base on HP only**.**

UNIT 5 **10 Hours**

Isometric Projections: Introduction to pictorial views emphasizing on Isometric View; Conventions, Isometric Scale, Isometric projections of right regular solids viz. prisms, pyramids, cone, cylinder and their frustums and sphere, combination of any two of these solids**. Conversion of Views:** Drawing orthographic views from given isometric view of simple machine parts.

TEXT BOOKS

1. K.R. Gopal Krishna (2016, Combined volume) "Engineering Drawing", Subhas Publication.
2. Bhatt N.D., Panchal V.M. & Ingle P.R., (2017), "Engineering Drawing", 53rd Edition, Publishing House, Anand, Gujarat.

REFERENCE BOOKS

1. Basanth Agrawal & C.M Agrawal (2012), Engineering Graphics, Tata Mc Graw Hill Publications.
2. Narayana K.L. & P. Kannaiah (2008), Text Book on Engineering Drawing, Scitech Publishers.
3. R K Dhawana (2006) Text Book of Engineering Drawing,3rd Rev. Edition, S Chand Publications.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Interpret the engineering drawings as per BIS convention.
CO2: Draw the different views of 2D and 3D objects in orthographic projections and solve practical problems involving distances and inclinations.
CO3: Visualise the sectional details of solids.
CO4: Able to access the principles of Isometric Projections and Draw primitive geometric objects and simple machine parts in two dimensions.

SCHEME OF EXAMINATION

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks

SEE - 20 * 5 = 100 Marks
(To be Scaled down to 50 Marks)

There shall be 10 questions

- Two full questions to be set from each unit with internal choice.
  - ✓ Minimum number of sub questions : 2
  - ✓ Maximum number of sub questions : 3
- Each full question shall be for a maximum of 20 marks.
- Answer any *Five* full questions choosing at least One full question from each unit.

CO-GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H	H					M					
CO2	H	H	M	M	H							
CO3	H		M									
CO4	H			M	H							M

L – Low, M – Medium, H – High

Course Title	**Engineering Physics Laboratory**					
Course Code	**21BSEPL106**					
Category	Basic Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	00	00	03	00	01	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Make students learn and understand basic concepts and principles of physics to analyse and solve various types of Physical problems.
2. Gain the practical knowledge of vibrations and to understand the concept of elasticity.
3. Study various mechanical properties such as Young's modulus, rigidilty modulus, bulk modulus of solids through different experiments.
4. Study physical properties such as density of solids through experiments.
5. Study optical properties such as interference and diffraction through experiments

List of Laboratory Experiments

1. Determination of density of glass.
2. Determination of frequency of tuning fork using volume resonator.
3. Determination of Young's Modulus of the material using single cantilever.
4. Determination of rigidity modulus of the given wire by torsional oscillations method.
5. Determination of frequency of AC mains using sonometer.
6. Measurement of energy gap of a semiconductor.
7. Determination of dielectric constant of the material by charging and discharging of the capacitor.
8. Study of B-H Curve in ferrites/soft iron using CRO.
9. Determination of Young's Modulus of the material using uniform bending method.
10. Measurement of radius of curvature of a lens by Newton's rings method.
11. Determination of thickness of a paper strip using air-wedge.
12. Estimation of numerical aperture and attenuation coefficient of an optical fibre.

TEXT BOOKS

1. R K Gaur and S L Gupta, Engineering Physics, Dhanpat Rai Publications, Revised edition 2011.
2. M N Avadhanulu, P G Kshirasagar, A Text Book of Engineering Physics, S. Chand Company Private Limited. Revised Edition 2015.
3. Ajay Ghatak, Optics, McGraw Hill Education (India) Private Limited, 5th Edition, 2012.
4. S P Basavaraju, Engineering Physics, Subhas Publications, 1998 & CBCS syllabus, Subhas Publications, 2016.
5. Srinivasan M R, Physics for Engineers,New Age International 2009.

REFERENCE BOOKS

1. Halliday, Resnick & Walker, Fundamentals of Physics, John Wiley & Sons, 2010.
2. Hitendra K Malik and A K Singh, Engineering physics, Tata McGraw Hill
3. Education private Limited, 2009.

4. Sears and Zemansky, University Physics with modern physics, 13th Edition, University Press.
5. H D Young and R A Freedman, University Physics, 13 Edition, Pearson.

EBOOKS / ONLINE RESOURCES

1. M N Avadhanulu, A Textbook of Engineering Physics,S. Chand Publishing, 1992, https://books.google.co.in/books?id=lTUNWOR_cDgC
2. Dattu R Joshi, Engineering Physics, Tata McGraw-Hill Education, 2010. https://books.google.co.in/books/about/Engineering_Physics.
3. V Rajendran, Engineering Physics, Tata McGraw-Hill Education, https://books.google.co.in/books/about/Engineering_Physics.html?id=KsXTNUCuby0C
4. Mahesh C Jain, Engineering Physics, PHI Learning Pvt. Ltd., 2009, https://books.google.co.in/books/about/Textbook_Of_Engineering_Physics.html?id=wKeDYbTuiPAC&redir_esc=y

MOOCS

1. http://nptel.ac.in/courses/122103010/ (Practicals)

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Apply the physics concepts relevantly and appropriately where ever required.

CO2: Understand the concept of theory of vibrations through experiments which helps to set up and solve differential equations related to the situation and the knowledge of elasticity that can be applied in different branches of Engineering.

CO3: The mechanical properties of solids will be understood by carrying out experiments of Young's modulus, rigidilty modulus, bulk modulus and the knowledge of these can be implemented in many day to day applications.

CO4: The physical properties of the materials will be understood by carrying out experiments of measurement of density of glass using which strength of the materials can be analyzed.

CO5: The optics experiments such as air wedge and Newtons rings shows he importance of the Physics of Optics their significance in various fields of Science and Technology.

SCHEME OF EXAMINATION

CIE - 50 Marks	Continuous evaluation	-	20 Marks
	Test at the end of the semester	-	20 Marks
	Viva voce	-	10 Marks
SEE - 100 Marks (To be Scaled down to 50 Marks)	Write up	-	20 Marks
	Execution & Calculation	-	60 Marks
	Viva Voce	-	20 Marks

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1		L	M									
CO2		L	M									
CO3		L	M									
CO4		L	M									
CO5		L	M									

L – Low, M – Medium, H – High

Course Title	**Electrical Engineering Laboratory**					
Course Code	**21ESEEL107**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	00	00	03	00	01	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Provide an exposure to common electrical components, their ratings and make electrical connections by wires of appropriate ratings.
2. Understand the usage of common electrical measuring instruments.
3. Understand the basic characteristics of transformers and electrical machines.
4. Understand VI characterization of electronic devices like diode & transistor (BJT).

List of Experiments / Demonstrations:

1. Verification of KCL & KVL for DC circuits.
2. Measurement of resistance
3. Two way / Three-way control of lamps.
4. Measurement of current, power & power factor of Fluoroscent-lamp (with & without capacitor), Incandescent lamp & LED lamp.
5. Measurement of Resistance & Inductance of a choke coil using 3 voltmeter method
6. Magnetization characteristics of DC shunt generator.
7. Torque speed characteristics of DC motor.
8. No-load & Short circuit test on single phase transformer & pre-determine the efficiency
9. Torque-Slip characteristics of three phase Induction motor.
10. Diode characteristics.
11. Transistor characteristics

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Get an exposure to common electrical components, their ratings and make electrical connections by wires of appropriate ratings.
CO2: Understand the usage of common electrical measuring instruments.
CO3: Understand the basic characteristics of transformers and electrical machines.
CO4: Understand VI characterization of electronic devices like diode & transistor (BJT).

SCHEME OF EXAMINATION

CIE - 50 Marks	Continuous evaluation	-	20 Marks
	Test at the end of the semester	-	20 Marks
	Viva voce	-	10 Marks
SEE - 100 Marks (To be Scaled down to 50 Marks)	Write up	-	20 Marks
	Conduction & Calculation	-	60 Marks
	Viva Voce	-	20 Marks

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H		H									
CO2	H	H										
CO3	M		M									
CO4	H		H									

L – Low, M – Medium, H – High

Course Title	**Communicative English & Technical Writing**					
Course Code	**21HSCE108**					
Category	Humanities and Social Science including Management Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	01	02	00	00	02	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to learn:
1. Communication skills.
2. Listening and Speaking skills.
3. Reading skills.
4. Language skills – Grammar and Vocabulary.
5. Writing skills.

UNIT 1: **08 Hours**

Communication Skills: Importance of good communication and social media etiquette, Process of communication, Types of communication – verbal and non-verbal, intrapersonal and interpersonal, general and technical, Technical communication – Modes and effective use of technology - based communication, Channels of communication – formal, informal and unofficial, Barriers to communication – semantic, interpersonal, organizational, cross-cultural, intrapersonal and physical, Introducing oneself and making requests, Asking for and giving directions / permission.

UNIT 2 **08 Hours**

Listening Skills: Importance of listening in communication, The difference between listening and hearing, Types of listening – Ignoring, selective listening to recall specific information, attentive listening to comprehend a lecture, empathetic listening, critical listening and creative listening, Techniques to hone listening skills, Practice exercises in taking notes, taking a message, identifying key points and global and local comprehension from the accompanying Audio CD. **Speaking Skills:** Telephone conversation, Making an oral presentation using visual aids or power point to present a product or a user manual, A short speech on any topic, Responding to questions at a job interview, Group discussion.

UNIT 3 **08 Hours**

Reading Skills: Skimming and scanning as techniques in reading comprehension, Ways of reading – Extensive reading for pleasure, intensive reading for factual information and interactive reading on the screen, Reading for local and global comprehension, Reading to summarize, Reading to interpret visual data such as graphs, tables, flow-charts and maps.

UNIT 4 **08 Hours**

Language Skills: Grammar - Present tense, Past tense and ways of expressing future time, Question tags, Prepositions, Articles, Conjunctions, Subject-verb agreement, Reported speech, Active and passive voice, Common errors, Modal verbs. **Vocabulary -** Idiomatic expressions, Prefixes and suffixes, synonyms and antonyms, homonyms and homophones, One-word substitutes, Words often confused, Linking words, Business and job-related vocabulary.

UNIT 5 **08 Hours**

Writing Skills: Drafting Email, Paragraph writing – narrative, cause-effect, comparative and descriptive, Letter writing – Letters of enquiry and complaint, Resume and cover letter, Essay writing -types of essays – narrative, descriptive, expository and argumentative, Writing reports and proposals, Technical writing – Creating user manuals, product descriptions and gadget reviews, Punctuation.

TEXT BOOK

1. Sudharshana N P and C Savitha, *English for Technical Communication*, Cambridge University Press India Pvt. Ltd, 2016.

REFERENCE BOOKS

1. Subhashini – *English and Communication Skills*, Innovative Publishers, Revised edition 2018.
2. *English Language and Communication Skills – Lab Manual Cum Workbook*, Cengage Learning India Pvt. Ltd, 2014.
3. Seely,John. *Oxford Guide to Effective Writing and Speaking*, Oxford University Press, 1998, 2005, 2012.
4. Krishnaswamy N, Manju Dhariwal and Lalitha Krishnaswamy, *Mastering Communication Skills and Soft Skills - Learner's Guide to Life Skills*, Bloomsbury, 2015.
5. Tyagi, Kavitha and Padma Misra, *Basic Technical Communication*, PHI Learning Private Limited, 2011.

MOOCs

1. Coursera – Improve your English Communication Skills – offered by Georgia Institute of Technology.
2. Coursera – Communication Skills for Engineers Specialization – Taught by Rice University.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Communicate complex engineering concepts within the profession and with society at large.
CO2: Have listening, speaking, reading and writing skills.
CO3: Comprehend and write effective reports and design documentation.
CO4: Give and effectively respond to clear instructions.

SCHEME OF EXAMINATION

<table>
<tr><th colspan="4">CIE - 50 Marks</th></tr>
<tr><td colspan="2">Unit I, II & III</td><td colspan="2">Unit IV & V</td></tr>
<tr><td>Test I</td><td>AAT I</td><td>Test II</td><td>AAT II</td></tr>
<tr><td>20 Marks</td><td>05 Marks</td><td>20 Marks</td><td>05 Marks</td></tr>
<tr><td colspan="4">SEE - 20 * 5 = 100 Marks
(To be Scaled down to 50 Marks)</td></tr>
<tr><td colspan="2">The question paper consists of 5 Units: Communication, listening and speaking, reading, grammar and vocabulary and writing.
(i) Answer questions from all the 5 Units.
(ii) Questions Q1 and Q2 on Unit I & II respectively, carry internal choice.
(iii) Questions Q3, Q4 and Q5 on Unit III, IV and V respectively, are compulsory with no internal choice.</td><td colspan="2">Q3. 1. Reading comprehension passage questions.
2. Summarize a passage.
Q4. 1. Grammar questions.
2. Vocabulary questions.
Q5. 1. Paragraph writing.
2. Letter / CV writing.</td></tr>
</table>

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1							H					
CO2							H					
CO3							H					
CO4							H					

L – Low, M – Medium, H - High

Course Title	**Media Presentation and Regulations**					
Course Code	**21AEMC109**					
Category	Ability Enhancement Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	00	02	00	00	01	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 02 Hours	

COURSE OBJECTIVES

The course will enable the students to learn:

1. The course will develop skills in 'Media Presentation Skills' and understanding of Media Regulations.
2. To introduce the students to the concept of communication, its methods, effective communication skills and public speaking.
3. Introduction to the comprehensive understanding of the five principles of Mass Media viz, Film, TV, Print, Radio and New Media.
4. To teach them effective presentation techniques for entertainment industry.
5. To make them understand the regulations, ethics and the regulations of media.

UNIT 1: **05 Hours**

Communication Skills: Effective interpersonal communication skills, Communication Essentials, Communication Techniques, Barriers to Communication, Communication Network in an Organization, Personal Communication, Internal Operational Communication, External Operational Communication, Horizontal(Lateral) Communication, Vertical(Downward) Communication, Vertical(Upward) Communication.

UNIT 2 **05 Hours**

Public Speaking and Presentation: Personal Appearance, Gestures, Postures, Facial Expression, Eye Contacts, Body Language(Kinesics), Time language, Silence, Tips for Improving Non-Verbal Communication, Presentation Skills, Preparing a PowerPoint Presentation, Greeting and introducing, Presenting a Paper, Group Discussions, Preparing for and Facing a Job Interview.

UNIT 3 **05 Hours**

Writing and Listening Skills: Effective Writing Skills, Elements of Effective Writing, Listening Skills, Purpose of Listening, Listening to Conversation (Formal and Informal), Active Listening- an Effective Listening Skill, Benefits of Effective Listening, Barriers to Listening, Academic Listening (Listening to Lectures), Listening to Talks and Presentations, Note Taking Tips.

UNIT 4 **10 Hours**

Audio-Visual Presentation Techniques: Anchoring for radio and TV, Voice modulation, Body Language, understanding the technical aspects of audio-visual media.

UNIT 5 **05 Hours**

Media Regulations: Freedom of speech and expression with reasonable restrictions, law of defamation, contempt of court, cyber crime, censorship, RTI Act, copy right act, self regulation by media.

REFERENCE BOOKS

1. Krishna mohan and Meera Banerjee. Developing communication skill.
2. Sanjay Kumar, Brilliant Communication skills, Oxford University Press, 2015.
3. Herbert Zettl, (2006) Television production Handbook. US Wadsworth.
4. PC Chatterjee, 1991 Broadcasting in India. Sage New Delhi.
5. Durga Das Basu, Laws of the Press in India Prentice Hall, Delhi.
6. Indian Press Laws by Radhakrishnamurthi India Law House).
7. Media & Press Laws by Gaurav Oberoi.
8. Press Laws & Media Ethics by Anil K Dixit Reference Press.
9. Media & Ethics by S. K Aggarwal Shipra Publication.
10. Jeary, Tony. Inspire Any Audience: Proven Secrets of the Pros for Powerful Presentations. Dallas: Trophy Publishing, 1996.
11. Paolo, Frank. How To Make a Great Presentation in 2 Hours. Hollywood, Fla.: Lifetime Books, 1994.
12. Simmons, Curt. Public Speaking Made Simple. Burlington, Mass.: Made Simple, 1996.
13. Strunk, William. The Elements of Style, Fourth Edition. Boston: Allyn & Bacon, 1999.
14. Walton, Donald. Are You Communicating? New York: McGraw-Hill, 1991.
15. Raman, Meenakshi & Sangeeta Sharma. Technical Communication: Principles and Practice. Second Edition. New Delhi: Oxford University Press, 2011.
16. Rutherford, Andrea J. Basic Communication Skills for Technology: Second Edition. Delhi: Pearson Education, 2007.
17. Kroehnert, Gary. Basic Presentation Skills. Sidney: McGraw Hill, 2010.
18. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.

EBOOKS / ONLINE RESOURCES

1. http://103.5.132.213:8080/jspui/bitstream/123456789/1122/1/Communication%20Skills.pdf
2. https://dl.uswr.ac.ir/bitstream/Hannan/141245/1/9781138219120.pdf
3. https://silo.tips/download/presentation-techniques-for-broadcasting
4. https://aclasites.files.wordpress.com/2017/02/cla-210-broadcast-presentation.pdf
5. https://www2.le.ac.uk/projects/oer/oers/media-and-communication/oers/ms7501/mod2unit11cg.pdf.
6. http://www.nraismc.com/wp-content/uploads/2017/03/303-PRESS_LAW___MEDIA_ETHICS_backup.pdf

MOOCs

1. https://bookboon.com/en/understanding-virtual-body-language-ebook.
2. https://www.mooc-list.com/tags/communication-skills.
3. https://onlinecourses.swayam2.ac.in/nou21_lb11/preview.
4. https://onlinecourses.nptel.ac.in/noc19_hs33/preview.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Student will be able to produce and present programmes for entertainment industry such as radio, cinema, Television and online platforms.

CO2: Students will acquire the knowledge of responsibilities regulation ethical bindings of media.

CO3: Students will acquire the skills to be effective Public speaker and gain knowledge of Technology based communication.

CO4: Student will be able to explain the potential understanding of writing and reading skills.

CO5: Student will be able to explain the potential contribution audio visual presentation techniques in personal development.

SCHEME OF EXAMINATION

CIE - 50 Marks		
Unit I, II & III	Unit IV & V	Assignments
Test I	Test II	Audio Visual Projects
10 Marks	10 Marks	30 Marks
SEE - 10 * 5 = 50 Marks		

There shall be 10 questions

- Two full questions to be set from each unit with internal choice.
  - ✓ Minimum number of sub questions : 2
  - ✓ Maximum number of sub questions : 3
- Each full question shall be for a maximum of 10 marks.
- Answer any *Five* full questions choosing at least One full question from each unit.

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	M	H										
CO2	M	H										
CO3			H									
CO4												
CO5												

L – Low, M – Medium, H – High

Course Title	**Engineering Chemistry**					
Course Code	**21BSEC110**					
Category	Basic Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Provide basic principles and various aspects of atomic, molecular orbitals: their applications.
2. Expose the students to understand the theory and prevention of electroplating/electroless plating in various industries and to study green chemistry protocols.
3. Study the construction, uses of modern day batteries.
4. Enable the students to learn preparation and applications of polymers and conducting polymers.
5. Provide the factors and control of corrosion.

UNIT 1 **10 Hours**

Atomic and Molecular Structure: Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic molecules**.** Bonding in solids: Ionic, covalent, metallic and molecular solids. Band theory of solids – Molecular orbital theory, linear combination of atomic orbitals, bonding and antibonding orbitals with hydrogen as example. Extension of band theory to metals, semiconductors and insulators. Semiconductors- Intrinsic and extrinsic – p and n- types, stoicheometric semiconducting compounds, numerical problems.

UNIT 2 **10 Hours**

Metal Finishing (04) - Technological importance. Effect of plating variables on electrodeposits. Electroplating techniques – methods of electroplating, surface preparation, plating of Cr. Electroless plating of copper for PCB. **Organic Reactions and Synthesis (06) -** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring-opening reactions. Green chemistry principles (12 principles) Atom economy: concept, AE in oxidation of benzene and butadiene. Microwave irradiation in organic synthesis: concept, advantages, synthesis of esters, oxidation reactions, amination of ketones; Bio-catalysis: Concept, advantages, synthesis of 6-aminopenicillanic acid.

UNIT 3 **10 Hours**

Use of Free Energy in Chemical Equilibria: Thermodynamic functions: energy, entropy and free energy. Free energy and emf. Cell potentials, the Nernst equation and applications**.** Battery technology: Introduction, basic concepts- Principal component of battery, classification, cell reactions and performance of primary battery – Zn-MnO_2, secondary batteries – working principle, cell reactions and performance of Pb-acid battery, Ni-Cd battery. Fuel cells – Definition, classification and advantages and limitations. Construction and cell reactions of H_2-O_2 fuel cell and methanol-oxygen fuel cell. Numerical problems.

UNIT 4 **10 Hours**

Stereochemistry (03): Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry, chirality, enantiomers, diastereomers, optical activity. Conformations in cyclohexanes (disbustituted only). Structures of different molecules**. Polymers (07) -** Definitions – Natural and synthetics polymers, mechanism of addition polymerization (free radical mechanism), – manufacture, properties and applications of HDPE and LDPE, polystyrene, phenol-formaldehyde, Teflon, poly methyl methacrylates, polyurethanes and polycarbonatesS. Elastomers: Synthesis, properties and uses of elastomers (synthetic rubbers) – Buna S and neoprene. Conducting polymers Definition, examples-PA, PPP,PPy difference between conducting polymers and conventional conductors. Reactions of all the preparations.

UNIT 5 **10 Hours**

Periodic Properties (05) – Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard and soft acids and bases, molecular geometries**. Corrosion Engineering (05) -** Metallic corrosion- definition, electrochemical theory of corrosion. Forms of corrosion, stress corrosion. Factors affecting the rate of corrosion. Corrosion control surface coatings, inorganic coatings – phosphating, anodizing, organic coatings – paints and enamels. Metal coatings – anodic metal coatings – galvanizing. Cathodic metal coatings – tinning. Corrosion inhibitors. Cathodic and anodic protection.

TEXT BOOKS

1. Engineering Chemistry by R. Gopalan, D. Venkappayya and Nagarajan, Vikas Publishing House Pvt. Ltd. 1999.
2. Chemistry for Engineering Students by Dr. B. S. Jai Prakash, Dr. Shivakumaraiah, Prof. R. Venugopal and Dr. Pushpa Iyengar.
3. Engineering Chemistry by Jain and Jain.

REFERENCE BOOKS

1. Solid State Chemistry and its applications by A.R. West, John Wiley, 1987.
2. Chemistry in Engineering and Technology Vol.1 and Vol.2 by J. C. Kuriacose and J. Rajaram, Tata McGraw – Hill Publishing Company Ltd.
3. Chemistry of advanced materials by C.N. R. Rao, Blackwell Scientific Publications,1993.
4. Solid state chemistry compounds by A. K. Cheethan and P. Day, Clarendon press, Oxford, 1992.
5. An introduction to electrochemistry by Glasstone, East-West Press Pvt.Ltd.,1985.
6. Chemical and electrochemical energy systems by R. Narayan and B. Viswanathan, University press, 1998.
7. Text book of polymer science by F. W. Billmeyer, Jr., John Wiley and Sons 1994.
8. Green Chemistry An Introductory Text by Mike Lancaster, Royal Society of Chemistry, 2002.
9. Green Chemistry Environment Friendly Alternatives by Rashmi Sanghi and M. M. Srivastava, Narosa Publishing House, 2003.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Understand the basic principles and various aspects diatomic molecules and band theory of solids.

CO2: Learn the various methods of metal finishing and green chemistry reactions.

CO3: Acquire the knowledge of the applications of batteries
CO4: Learn the preparation and applications of polymers and conducting polymers.
CO5: Have the chemical knowledge of the control of corrosion.

SCHEME OF EXAMINATION

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			

There shall be 10 questions

- Two full questions to be set from each unit with internal choice.
  - ✓ Minimum number of sub questions : 2
  - ✓ Maximum number of sub questions : 3
- Each full question shall be for a maximum of 20 marks.
- Answer any *Five* full questions choosing at least One full question from each unit.

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H		L		H							
CO2		L		H								
CO3			H									
CO4	L	L										
CO5			M		L							

L – Low, M – Medium, H – High

Course Title	**Programming for Problem Solving**					
Course Code	**21ESPP111**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Familiarize with fundamental of C, writing of algorithms and philosophy of problem solving.
2. Develop arithmetic reasoning and analytical skills to apply knowledge of C programming and its constructs to solve engineering problems.
3. Use and implement data structures like arrays and structures to obtain solutions.
4. Define and use of pointers with simple applications.
5. Understand the basic concepts of Object Orientated Programming Structure (OOPs) with C++.

UNIT 1 **10 Hours**

Introduction to Computer Hardware and Software: Computer generations, computer types, bits, bytes and words. CPU, Primary memory, Secondary memory. Input and Output devices, Ports and connections, input devices, output devices, Computers in a network, Network Hardware Software basics, software types. **Overview of C:** Basic Structure of C program, Executing a C program, Formatted Input and Output Functions. **Preprocessor directives**. **Constant, Variable, Data Types:** Variable Names, Data Types and Sizes, Constants, Declarations, Arithmetic Operators, Relational and Logical Operators, Type Conversions. **Operators and Expressions. Conditional branching:** Decision making with if, else-if, nested if, switch, Ternary Operator and the goto statement.

UNIT 2 **10 Hours**

Looping Statements: The while and do-while statements, for statement and Jumps in loops**. Arrays:** Arrays (1D, 2D) Introduction to arrays, Declaration and initialization of One dimensional arrays, Two-Dimensional arrays and Multi Dimensional arrays. Example programs on 1D and 2D arrays. **Strings:** Declaring and initializing string variables. Reading strings from terminal and writing strings to screen, string concatenation, string comparison and string handling functions. **Searching Algorithms:** Linear search and Binary Search**. Sorting Algorithms:** Bubble sort and selection sort.

UNIT 3 **10 Hours**

User-Defined Functions: Introduction need for user-defined functions, storage classes, Elements of user-defined functions, Categories of functions, Functions that return multiple values. **Recursion**: Introduction, Passing arrays to functions, passing strings to functions and the scope visibility and lifetime of variables. **Pointers**: Introduction, understanding pointers, accessing the address of a variable. Declaring, initialization of pointer variables and accessing a variable through its pointer. Pointers as function arguments, function returning pointer. **Dynamic Memory Allocation:** Introduction, Library functions for dynamic memory allocation.

UNIT 4 **10 Hours**

Structures: Introduction, Defining and Declaring structure variables with example programs. Accessing structure members, structure initialization, copying and comparing structure variables. Operations on individual members, arrays of structures, arrays within structures. Structures within structures, structures and functions. Difference between Structures and Unions**, Files:** Introduction to Files**,** Concatenate the contents of two files**.**

UNIT 5 **10 Hours**

Introduction to C++: Overview, Basic Structure, Input and Output Functions, Difference between C and C++. **Basic concepts of OOPs:** Introduction, Difference between POP (Procedure Oriented Programming) and OOPs **(**Object Orientated Programming Structure), Class, Object, Method, Inheritance, Encapsulation, Polymorphism, Data Abstraction.

Note: The concepts in all 5 units to be supported by Example Programs.

TEXT BOOKS

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill 2017.
2. K R Venugopal and R Prasad: Mastering C, 2nd Edition, McGraw-Hill, 2017.
3. E. Balaguruswamy, Object Oriented Programming with C++, TMH, 6th Edition, 2013.

REFERENCE BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie: The C Programming Language, 2nd Edition, PHI, 2012.
2. Herbert Schildt, C: The Complete Reference, 4th Edition, McGrawHill, 2003.
3. Byron Gottfried, Schaum's Outline of Programming with C, 2nd Edition, McGraw-Hill.
4. Yashvant Kanetkar, Let us "C", BPB publications, 10th Education, 2010.
5. K R Venugopal and Rajkumar Buyya, Mastering C++ 2nd Edition, McGraw-Hill, 2013.
6. Object Oriented Programming using C++, Robert Lafore, Galgotia Publication, 2010.

EBOOKS / ONLINE RESOURCES

1. Introduction to C Programming by ROB Miles
   http://www.control.aau.dk/~jdn/edu/doc/arduino/litt/C%20Programming.pdf.
2. C Programming tutorial by Mark Burgers
   http://markburgess.org/CTutorial/C-Tut-4.02.pdf.
3. http://www.lysator.liu.se/c/bwk-tutor.html#introduction
4. http://www.acm.uiuc.edu/webmonkeys/book/c_guide/

MOOCs

1. http://nptel.ac.in/courses/106105085/4
2. http://www.lynba.com/C-training-tutorials/1249-0.html
3. Ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010
4. www.cse.iitb.ac.in/~CS101/2011.1/

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Understand and explore the fundamental Computer Concepts and basic Programming Principles like data types, Operators, input/output functions, Programming constructs and user defined functions.
CO2: Develop and analyze algorithmic solutions to problems.
CO3: Design and Implement C Programs in efficient, robust and reusable code.

CO4: Apply appropriate concepts of data structures like arrays, structures, pointers etc., for various applications.

CO5: Apply programming concepts such as OOPs, memory allocation / relinquish, file handling and pointers in implementing the real world computer problems.

SCHEME OF EXAMINATION

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			

There shall be 10 questions

- Two full questions to be set from each unit with internal choice.
  - ✓ Minimum number of sub questions : 2
  - ✓ Maximum number of sub questions : 3
- Each full question shall be for a maximum of 20 marks.
- Answer any *Five* full questions choosing at least One full question from each unit.

CO-GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H			H	M							L
CO2	H			H	M							L
CO3	H				M							L
CO4		H		H	M							L
CO5	H	H			M							L

L – Low, M – Medium, H – High

Course Title	**Principles of Electronics**					
Course Code	**21ESPE112**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Impart the knowledge of working principles of semiconductor devices and their applications.
2. Teach the working principles of transistors, their characterization, and application.
3. Teach the principles of feedback in amplifiers and oscillators and operational amplifiers and its applications.
4. Understand basic digital circuits and principles of logic design.
5. Provide the understanding of basic communication systems with concepts of modern communication technologies.

UNIT 1 **10 Hours**

Semiconductor Diodes and Applications: Introduction to semiconductor diodes, V-I characteristics of diodes, AC and DC equivalent circuits, Special Diodes: Zener diode, Tunnel diode, Varactor diode, LED, OLED, and Photo diode; Rectifiers: HWR, FWR, Bridge rectifier – efficiency, ripple factor; C-filter – ripple factor, Zener diode regulator – line & load regulation, Block diagram of regulated power supply & applications: battery charger; Clipper and Clamper circuits.

UNIT 2 **10 Hours**

Transistors and Applications: Transistors: BJT, JFET, MOSFET: Principle of operation and I-V Characteristics, BJT: Transistor Configuration- CB, CE, CC; DC Analysis - voltage divider bias, RC coupled amplifier - frequency response. JFET: DC analysis, CS amplifier

UNIT 3 **10 Hours**

Feedback Oscillators & Operational Amplifiers (Op-Amps): Feedback: Types of feedback, Effect of feedback on amplifier characteristics. Sinusoidal oscillators: Barkhausen criteria; RC phase shift, Hartley's, Colpitts oscillators and Crystal oscillator; Ideal Op-Amp VTC and its characteristics; Applications of Op-Amps: voltage follower, inverting and non-inverting amplifier, adder and subtractor, integrator and differentiator, comparator.

UNIT 4 **10 Hours**

Digital Electronics: Number systems and Code conversions, Boolean Algebra, De-Morgan's Theorems, Logic Gates, SOP & POS representation and simplification, Realization of Boolean equations using basic gates. Combinational logic circuits: Half adder and full adder; Sequential logic circuits: Flip-Flops, shift registers, Counters: 3 bit- synchronous and asynchronous counter.

UNIT 5 **10 Hours**

Communication Systems: Introduction to communication systems, AM: Modulation and demodulation, Power relations and bandwidth in AM; AM transmitter, AM receiver; FM and its applications. Concepts of 3G, 4G, and 5G, Bluetooth, WiFi, Zigbee; Mobile Communication – frequency reuse, roaming & handoffs; Satellite Communication (block diagram level).

REFERENCE BOOKS

1. Millman and Halkias,"Electronics Devices and Circuits", TMH Publishers.
2. Robert L Boylestad and Neshelsky, "Electronic Devices and Circuit Theory", Pearson Education, 9th edition, 2005.
3. A.P. Malvino, "Electronics Principles", TMH Publishers, 6th edition.
4. Morris Mano, "Digital Logic and Computer Design", Pearson Education Publishing.
5. Simon Haykin, "Communication Systems", John Wiley.
6. T. S. Rappaport, "Wireless Communications Principles and Practice", 2nd edition, 2010.

EBOOKS / ONLINE RESOURCES

1. http://gk12.poly.edu/amps-cbri/pdf/Basic%20Electronics.pdf,2012
2. http://www-f9.ijs.si/~gregor/ElektronikaVaje/ElectronicsLectures_GinGrich.pdf
3. https://www.electronics-notes.com/articles/connectivity/

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Analyze the working of semiconductor devices and electronic circuits like regulated power supplies.
CO2: Analyze and design BJT and JFET amplifiers.
CO3: Realize BJT oscillators and electronic circuits using Operational amplifiers.
CO4: Understand Boolean Algebra and analyze and design digital circuits.
CO5: Understand the working of modern communication technologies.

SCHEME OF EXAMINATION

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			

There shall be 10 questions

- Two full questions to be set from each unit with internal choice.
  - ✓ Minimum number of sub questions : 2
  - ✓ Maximum number of sub questions : 3
- Each full question shall be for a maximum of 20 marks.
- Answer any *Five* full questions choosing at least One full question from each unit.

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H	M										M
CO2	H	H										M
CO3	H	M										M
CO4	H	M										M
CO5	H	L										M

L – Low, M – Medium, H – High

Course Title	**Mechanical Engineering Sciences**					
Course Code	**21ESME113**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Study thrust areas of Mechanical Engineering to understand the role of mechanical engineers in the industry and society.
2. Understand conventional and renewable energy resources and their applications in power plants and expose to various engineering materials and their applications.
3. Study the basic concepts of internal combustion engines and Refrigeration.
4. Gain the knowledge about principles of materials processing, machine tools, metal joining techniques, power transmission systems used in automobiles and fasteners.
5. Know about modern trends in mechanical engineering like Smart manufacturing, IoT, Automation, Robotics and their applications, CNC and EVs.

UNIT 1 **10 Hours**

Role of Mechanical Engineers in Industries and Society: Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace and Marine sectors and contribute to the GDP. **Energy Sources and Power Plants**: Review of energy sources, Principle and Operation of Hydel power plant, Thermal power plant, Nuclear power plant, Solar power plant and Wind power plant. **Engineering Materials:** Metals-Ferrous: Tool steels and stainless steels. Non-ferrous /metals: aluminium alloys. Ceramics-Glass, optical fibre glass, cermets. Composites- Fiber reinforced composites, Metal matrix Composites. Smart materials- Piezoelectric materials, shape memory alloys, semiconductors and super- insulators.

UNIT 2 **10 Hours**

Fundamentals of IC Engines: Petrol and Diesel: 2-Strokes and 4-Strokes engines, Otto Cycles and Diesel Cycle. Performance Characteristics of IC Engines - Indicated Power, Brake Power, Frictional Power, Thermal Efficiencies, Mechanical Efficiency and Specific Fuel Consumption. Application of IC Engines. **Refrigeration:** Principle of refrigeration, Refrigeration effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties. Principles and Operation of Vapor Compression and Vapor absorption refrigeration. Domestic and Industrial Applications of Refrigerator.

UNIT 3 **10 Hours**

Materials Processing: Principle of casting, rolling, forging, sheet metal forming, extrusion (elementary idea only). **Metal Joining Processes**: soldering, brazing and welding - arc welding, Oxy-acetylene welding, TIG welding and MIG welding (elementary idea only). **Fundamentals of Machining and machine tools**: Principle of metal removal, Working Principle of Lathe, Milling and Drilling Machines. Brief description of operations carried out

on Lathe, Milling and Drilling machines. **Introduction to Modern Manufacturing Techniques:** Concepts of Smart Manufacturing and Industrial IoT. (No sketches of Machine tools, sketches to be used only for explaining operations. Students to be shown the available machine tools in the Machine Shop of the college before explaining the operations).

UNIT 4 **10 Hours**

Automobiles and Power Transmission: Different types of automobiles, types of power units in automobiles; brief description of major components and their functions. Gear Drives: Types - spur, helical, bevel, worm and rack and pinion**.** Belt Drives: Types of belt drives, Flat-Belt Drive, V-Belt Drives. **Fasteners:** Definition, Classification, brief description of permanent, temporary, threaded and non-threaded fasteners.

UNIT 5 **10 Hours**

Automation and Robotics: Automation - Definition, types –Fixed, Programmable & Flexible automation with examples. CNC technology: Introduction, components of CNC, advantages and applications of CNC, CNC Machining centers and Turning Centres. **Robotics -** Robot anatomy, Joints & links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly and Inspection. **Electric and Hybrid Vehicles -** Components of Electric and Hybrid Vehicles, Batteries for EV, Chargers, Power devices, Drives and Transmission. Advantages and disadvantages of EVs and Hybrid vehicles.

TEXT BOOKS

1. Elements of Mechanical Engineering, K R Gopalakrishna, Subhash Publications.
2. Elements of Workshop Technology (Vol. 1 and Vol. 2), Hazra Choudhry and Nirzar Roy, Media Promotors and Publishers Pvt. Ltd.,2010.
3. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition,, 2012.

REFERENCE BOOKS

1. Introduction to Engineering Materials", B.K. Agrawal ,Tata McGraHill Publication, New Delhi.
2. Basic and Applied Thermodynamics, P.K.Nag, Tata McGraw Hill 2nd Ed., 2002.
3. CAD/CAM/CIM, Dr. P Radhakrishnan, 3rd edition, New Age International Publishers, New Delhi.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Apprise the mechanical engineering and the role of mechanical engineers in the industry and society.

CO2: Describe the various energy sources and power plants and summarize the composition, properties and application of engineering materials.

CO3: Discuss the construction and application of IC Engines, Refrigerators and analyze their performance.

CO4: Explain the principle of various materials processing, metal joining processes and machine tools.

CO5: Describe the elements of power transmission tools and summarize the fasteners.

SCHEME OF EXAMINATION

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			

There shall be 10 questions

- Two full questions to be set from each unit with internal choice.
  - ✓ Minimum number of sub questions : 2
  - ✓ Maximum number of sub questions : 3
- Each full question shall be for a maximum of 20 marks.
- Answer any *Five* full questions choosing at least One full question from each unit.

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H			M	H			H				
CO2	H		H	M					H			
CO3	H		M	M					H			
CO4	H								L			
CO5	H			M								

L – Low, M – Medium, H - High

Course Title	**Engineering Chemistry Laboratory**					
Course Code	**21BSECL114**					
Category	Basic Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	00	00	03	00	01	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Determination of hardness of water.
2. Estimation of calcium oxide in cement.
3. Determine of copper in brass alloy.
4. Determine of COD in industrial waste water.
5. Determine of iron in hematite.

PART- A

1. Preparation of standard EDTA solution and determination of total hardness of water.
2. Preparation of standard EDTA solution and determination of calcium oxide in the given sample of cement solution (rapid EDTA method).
3. Determination of Cu% in brass using standard sodium thiosulphate solution.(brass solution to be prepared by weighing the brass sample).
4. Preparation of standard dichromate solution and determination of iron in the given sample solution of hematite ore (external indicator method).
5. Determination of manganous dioxide in the pyrolusite using potassium permanganate solution (pyrolusite is to be weighed).
6. Determination of chemical oxygen demand of the given industrial waste water sample.
7. Estimation of Ca^{2+} ions in the solution of dolomite.

PART- B

1. Determination of pKa value of a week acid using pH meter
2. Colorimetric determination of iron/copper/any other metal.
3. Estimation of hydrochloric acid using standard sodium hydroxide solution conductometrically.
4. Determination of coefficient of viscosity of a given liquid using Ostwald's viscometer (density of the liquid is to be given)
5. Kinetics of acid hydrolysis of methylacetate.

PART- C

1. Demonstration of chemistry software – Viscosity experiment, demonstration of IR spectroscopy.
2. Demonstration of gravimetric estimation of nickel using dimethylglyoxime.
3. Demonstration of synthesis organic compound using microwave irradiation (synthesis of asprin, glucose pentaacetate, oxidation and reduction reactions).
4. Flamephotometric determination of sodium/potassium.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Understand the safety practices in the chemistry laboratory.
CO2: Develop awareness regarding toxicity of chemicals.
CO3: To study the construction, uses of modern day batteries.
CO4: To enable the students to learn preparation and applications of polymers and conducting polymers.
CO5: Enthuse learners to conduct experiments by arousing the curiosity which would help them in learning basics and advanced concepts through chemistry experiments.

SCHEME OF EXAMINATION

CIE - 50 Marks	Continuous evaluation	-	20 Marks
	Test at the end of the semester	-	20 Marks
	Viva voce	-	10 Marks
SEE - 100 Marks (To be Scaled down to 50 Marks)	Write up	-	20 Marks
	Execution & Calculation	-	60 Marks
	Viva Voce	-	20 Marks

Note: For examination an experiment each from Part – A and Part – B shall be set. Under Part – A, a common experiment shall be set for all the candidates while under Part – B, different experiment may be set.

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	L		L		L							
CO2		L		L								
CO3			M		H							
CO4	L	L										
CO5		M			M							

L – Low, M – Medium, H - High

Course Title	**Programming for Problem Solving Laboratory**					
Course Code	**21ESPPL115**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	00	00	03	00	01	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Apply the specification of syntax rules for numerical constants and variables, data types.
2. Usage of Arithmetic operator, Conditional operator and relational operators and other C constructs.
3. Write C programs using decision making, branching, looping constructs.
4. Apply and Write C programs to implement one dimensional and two dimensional arrays.
5. Solving Problems using strings, structures and pointers.

LAB PROGRAMS

Solve the following problems using C.

1. a. Find the all possible roots of quadratic equation.
   b. Find the reverse of an integer and check whether it is a palindrome or not.
2. a. Find the GCD of two integers
   b. Generate and print first N Fibonacci numbers using recursion.
3. a. Compute mean, variance and standard deviation of N real numbers.
   b. Search an element using linear search method.
4. a. Interchange the largest and smallest number in the array.
   b. Search an element using binary search method.
5. a. To check whether a given string is palindrome or not without using library functions
   b. Find the number of vowels, consonants, digits and white spaces in a string.
6. a. Delete an element from an array.
   b. Sort N elements of an array in ascending order using bubble sort technique.
7. Read a matrix A of size MxN and to find the following.
   (i) Sum of the elements of the row.
   (ii) Sum of the elements of the column.
   (iii) Sum of all the elements of the matrix.
   (iv) Sum of both diagonal elements of a matrix.
   Output the computed results with suitable headings.
8. Input 2 matrices of size M x N and P x Q. Perform
   a. Multiplication if they are compatible.
   b. Transpose of the resultant matrix.
   Print the result in matrix form with suitable headings.
9. a. Swap the contents of two variables using pointers.
   b. Concatenate the contents of two files.
10. Define a Structure called Employee with Emp ID, Emp-name and Salary as its data members. Read details of N Employees and display the details of employees whose salary is greater than ₹15000.

11. Create a structure called student with student name, roll-no, marks in three tests. Write a C program to create N records and
    (i) Search on roll-no and display all the records
    (ii) Average marks in each test
    (iii) Highest in each test.
12. a. Store a character string in a block of memory space created by malloc( ) and then modify the same to store a large string.
    b. Reverse the elements of an array using pointers.

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Develop programs using concept of decision making statements and arrays.
CO2: Reduce the complexity of the programs by making use of functions.
CO3: Experiment with programs using concepts like pointers, files, structures.
CO4: Experiment with programs using concepts like dynamic memory allocation.

SCHEME OF EXAMINATION

CIE - 50 Marks	Continuous evaluation	-	20 Marks
	Test at the end of the semester	-	20 Marks
	Viva voce	-	10 Marks
SEE - 100 Marks (To be Scaled down to 50 Marks)	Write up	-	20 Marks
	Execution & Calculation	-	60 Marks
	Viva Voce	-	20 Marks

SEE: The Candidate shall write and execute ONE complete program in SEE.

CO-GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H			L	M							L
CO2	H			L	M							L
CO3	H	H		M	M							L
CO4	H	H		M	M							L

L – Low, M – Medium, H - High

Course Title	**Workshop Practice**					
Course Code	**21ESWS116**					
Category	Engineering Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	01	00	03	00	02	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Impart engineering students the knowledge of different manufacturing processes employed in producing products.
2. Train the students to use basic tools used in Fitting, Carpentry, Welding, Sheet metal and Soldering.
3. Understand the working of different mechanical devices by way of demonstration of the working of basic machine tools of machine shop, steps involved in wood turning and smithy.
4. Equip the students with the knowledge and skill to produce simple components.

FITTING SHOP **08 Hours**

Introduction to different tools used and material used. Exercises in fitting shop comprising preparation of different joints using files, hacksaw, taps, dies and drills using mild steel flats.

WELDING SHOP **08 Hours**

Introduction to welding, different types of welding operation and uses. Exercises in welding shop comprising of using arc welding to weld lap joint, butt joint and L – Joint in using mild steel flats.

CARPENTARY AND WOOD TURNING SHOP **10 Hours**

Introduction to types of tools and woods used. Exercises in Carpentry shop comprising planning and chiseling and preparation of different joints like dove-tail joint Tenon Mortise wood joint and preparation of two wood turning models.

SHEET METAL **08 Hours**

Introduction to sheet metal and soldering operations. Exercises in sheet metal shop comprising development of simple tray, funnel, and cylinder. soldering of formed simple tray, funnel and cylinder in G.I. sheet.

SMITHY SHOP **06 Hours**

Introduction to smithy, tools used, forging operations and 2 models: round rod to square rod and L – shaped pin of given length using M S rods. Use of power tools to make one of the models in each shop.

Note: Smithy shop and Wood turning shop are only introduction and Demo. Not for examination.

TEXT BOOKS

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. R.K Rajput, "Comprehensive Workshop Practice", New edition, Laxmi Publication Pvt. Ltd, New Delhi, 2001.

REFERENCE BOOKS

1. Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – r' Pearson Education, 2008.
2. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
3. Rao RN., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

EBOOKS / ONLINE RESOURCES

1. Drilling- https://www.youtube.com/watch?v=om6GQKfoS1g
2. Welding- https://www.youtube.com/watch?v=CCzhT81GrBo
3. Brazing- https://www.youtube.com/watch?v=UL37hjhKEjk
4. Soldering- https://www.youtube.com/watch?v=BLfXXRfRIzY
5. Fitting operations- https://www.youtube.com/watch?v=A9m_3onoVV8
6. Carpentry- https://www.youtube.com/watch?v=YVXnL3LECpc
7. Arc welding- https://www.youtube.com/watch?v=DIf_l8l5BkY
   https://www.youtube.com/watch?v=TeBX6cKKHWY
8. Gas Welding- https://www.youtube.com/watch?v=6o6XWWbWvIU
9. Brazing- https://www.youtube.com/watch?v=m678-clpbjw

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Upon completion of course, the students will gain the knowledge of the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials.

CO2: Students will be able to fabricate simple components using the tools of basic workshop.

CO3: They will also get practical knowledge of the dimensional accuracies possible with a few different manufacturing processes.

CO4: They will also get the practical knowledge to produce small components based on the skill acquired in the workshop practice.

SCHEME OF EXAMINATION

CIE - 50 Marks	(i)	Fitting and Welding Models: 10 + 05 Marks	-	15 Marks
	(ii)	Carpentry and Sheet Metal: 10 + 10 Marks (2 models to be made in each workshop section)	-	20 Marks
	(iii)	Quiz and Test: 05 + 10 Marks	-	15 Marks
SEE - 100 Marks (To be Scaled down to 50 Marks)	(i)	Major Model (Fitting or Carpentry)	-	50 Marks
	(ii)	Minor Model (Welding or Sheet Metal)	-	30 Marks
	(iii)	Viva Voce Examination	-	20 Marks

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H				H							M
CO2	M				H							
CO3				M	H							M
CO4	H											M

L – Low, M – Medium, H – High

Course Title	**Design Thinking and Innovation**					
Course Code	**21AEDI117**					
Category	Ability Enhancement Courses					
Scheme and Credits	No. of Hours / Week					Semester – I / II
	L	T	P	SS	Credits	
	00	02	00	00	01	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 02 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. To study the thinking of doing a creative models to understand the role of engineers in the industry and society.
2. To understand the need for the industry and designing by brain storming with new ideas.
3. To study the challenges of doing a creative lateral thinking and change in the mind set.
4. To gain the knowledge about the product and use of its application.
5. To understand the capability of prototype and challenges in making it into real type.

UNIT 1 **06 Hours**

What is Innovation – Creativity vs. innovation – types of innovation – Innovation Process - Strategies for Innovation - Role of entrepreneurship in innovation management**.**

UNIT 2 **06 Hours**

The feedstock of innovation – creativity viz. Definition of creativity and problem solving - Creative Problem Solving - Understanding the Challenge - Brainstorming - Preparing for Action - Planning the Approach to Creative Problem Solving - Understanding the Context - The Role of Content – Blocks to creativity – strategies for unblocking.

UNIT 3 **06 Hours**

Thinking & Mindsets viz., lateral thinking - Systematic Inventive Thinking - convergent thinking – divergent thinking – Growth & Fixed Mindsets – Innovator's Mindset.

UNIT 4 **06 Hours**

The use of Design Thinking in Innovation viz. What is Design Thinking? – Five stages of Design Thinking – Ethnography & Empathy Maps – Problem Definition – Journey Mapping – Idea Generation – Prototyping – Learning Launch**.**

UNIT 5 **06 Hours**

To investigate the importance of IP in business innovations viz., Understanding Fundamentals of Patents – Design, Trademark and Copyrights – Process of IP creation – IP Management**.**

REFERENCE BOOKS

1. Pradip N Khandwalla, Lifelong Creativity, Tata Mc Graw Hill, 9th edition, 2011.
2. Pradip N Khandwalla, Corporate Creativity: The Winning Edge, McGraw Hill Education; 1 edition, July 2017.

3. Constantine Andriopoulos, Patrick Dawson, Managing Change, Creativity and Innovation, SAGE Publications Ltd, 2011.
4. Edward de Bono, Lateral Thinking, Penguin Publications, 2009.
5. Jeanne Liedtka, Design Thinking for Growth for Managers, 2011.
6. Jeanne Liedtka, Andrew King, Kevin Bennett, Solving Problems with Design Thinking: 10 stories that work, Columbia Business School Publications, 2013.
7. IDEO Design Thinking https://designthinking.ideo.com/.
8. Tom Kelley and Jonathan Littman, Ten faces of Innovation, Profile Books Limited, 2017.
9. Tom Kelley, The Art of Innovation, Profile Books Limited, 2016

EBOOKS / ONLINE RESOURCES

1. http://www.darden.virginia.edu/faculty-research/directory/jeanne-m-liedtka/.
2. https://www.ideo.com/eu.
3. https://www.strategyand.pwc.com/innovation1000
4. http://www.innovationmanagement.se/
5. https://www.edwdebono.com/
6. http://www.sitsite.com/

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Appraise the thinking in engineering and the role of engineers in the industry and society.

CO2: Describes critical thinking skills through business innovation/ design thinking topics as lateral thinking, divergent & convergent thinking.

CO3: Discusses the Design thinking skills such as empathy mapping, Journey mapping, brainstorming, idea seeding, prototyping and learning launch.

CO4: Ethics through discussions on ethical research practices and the ethical treatment of human subjects.

CO5: The topics covered in this course are strongly related to introductory courses on business innovation, creativity and creative thinking, entrepreneurship, project management, and social network analysis.

SCHEME OF EXAMINATION

<table>
<tr><th colspan="4">CIE - 50 Marks</th></tr>
<tr><td colspan="2">Unit I, II & III</td><td colspan="2">Unit IV & V</td></tr>
<tr><td>Test I</td><td>AAT I</td><td>Test II</td><td>AAT II</td></tr>
<tr><td>20 Marks</td><td>05 Marks</td><td>20 Marks</td><td>05 Marks</td></tr>
<tr><th colspan="4">SEE - 10 * 5 = 50 Marks</th></tr>
<tr><td colspan="4">There shall be 10 questions
• Two full questions to be set from each unit with internal choice.
✓ Minimum number of sub questions : 2
✓ Maximum number of sub questions : 3
• Each full question shall be for a maximum of 10 marks.
• Answer any Five full questions choosing at least One full question from each unit.</td></tr>
</table>

CO – GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	L			M								
CO2	L		M									
CO3	L			M								H
CO4	L											
CO5	L			M								H

L – Low, M – Medium, H – High

Course Title	**Engineering Mathematics – II**					
Course Code	**21BSEM201**					
Category	Basic Science Courses					
Scheme and Credits	No. of Hours / Week					Semester – II
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES

The course will enable the students to:

1. Be able to solve analytically all sorts of first-order ordinary differential equations which often appear in engineering applications.
2. Develop an analytical technique to solve various higher-order differential equations of the type constant and variable coefficients, and both homogenous and non-homogeneous.
3. Analyze the Laplace transforms for various standard functions, periodic functions, compute inverse Laplace transform, and solve the differential equations.
4. Study special functions like Bessel's and Legendre's functions.
5. Understand the double and triple integral concepts, change the order of integrations, variables and solve problems involving cubes, sphere, and vector integrals.

UNIT 1 **10 Hours**

First Order Ordinary Differential Equations: Variable separable method, Homogeneous forms, linear, Bernoulli's equations, Exact equations, Reducible equations to exact equations, Euler's equations; Orthogonal trajectories-Cartesian and polar forms**.**

UNIT 2 **10 Hours**

Ordinary Differential Equations of Higher Orders: Second and higher-order differential equations, homogeneous linear equations with constant and variable coefficients, non-homogeneous linear equations with constant and variable coefficients- problems, method of variation of parameters, method of undetermined coefficients.

UNIT 3 **10 Hours**

Laplace Transform: Definition and Laplace transforms of elementary functions. Laplace Transforms $e^{at}f(t)$, $t^n f(t)$ and $\frac{f(t)}{t}$ (without proofs) periodic functions and unit-step of function-problems. **Inverse Laplace Transform** - problems, Convolution theorem to find the inverse Laplace transforms (without proof) and problems, solution of linear differential equations using Laplace Transforms.

UNIT 4 **10 Hours**

Special Functions: Bessel's functions- basic properties, recurrence relations, orthogonality, and generating functions. Legendre's functions- Legendre's polynomial, Rodrigue's formula, problems**.**

UNIT 5 **10 Hours**

Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian),change of order of integration in double integrals, Change of variables (Cartesian

to polar), Applications: areas and volumes; Triple integrals (Cartesian), Orthogonal curvilinear coordinates, simple applications involving cubes, sphere and rectangular parallelopipe; line and surface integrals, vector surface integrals, theorems of Green, Gauss and Stokes (without proofs)**.**

TEXT BOOKS

1. B. S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 44th edition, 2017.
2. E. Kreyszig, "Advanced Engineering Mathematics"-Wiley, 2019.

REFERENCE BOOKS

1. B. V. Ramana "Higher Engineering Mathematics" Tata McGraw - Hill, 2006.
2. N. P. Bali and M. Goyal, "A Textbook of Engineering Mathematics", Laxmi publications, latest edition.
3. H. K Dass and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Publishing, 1st edition, 2011.

EBOOKS / ONLINE RESOURCES

1. http://tutorial.math.lamar.edu/
2. https://ocu.mit.edu/courses/mathematics/18-06-linear-algebra-spring- 2010/vidoe-lectures/(Gilbert Strang vedio lectures)
3. http://nptel.ac.in/downloads/122101003(lecturenotes)
4. https://www.youtube.com/results?search_query=Lecture+Series+on+Mathematics+lll+by+Dr.P.N.Agrawal

MOOCs

1. http://nptel.ac.in
2. http://academicearth.org

COURSE OUTCOMES

The students at the end of the course will be able to:

CO1: Solve analytically all sorts of first-order linear and nonlinear differential equations.
CO2: Solve higher-order differential equations with constant and variable coefficients and also homogeneous and non-homogeneous differential equations.
CO3: Compute the Laplace transforms of standard functions, periodic functions, compute inverse Laplace transform, and solve the differential equations.
CO4: Solve 3-dimensional wave equation using special functions.
CO5: Evaluate the double and triple integral, change the order of integrations and variables.

SCHEME OF EXAMINATION

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CO1	H	M										L
CO2	H	M										L
CO3	H	M										L
CO4	H	M										L
CO5	H	M										L

L – Low, M – Medium, H – High