Smt.Indira Gandhi College of Engineering
(An Autonomous institute NAAC 'A' Grade)
Approved by AICTE, Affiliated to the University of Mumbai

CURRICULUM STRUCTURE FOR UNDERGRADUATE ACADEMIC PROGRAMS IN FIRST YEAR ENGINEERING

(BASED ON NEP 2020)

Scheme Name: SIGCE25R0

W.E.F. A.Y. 2025-26 [2025-2028 BATCH]

Preamble

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated, and taken forward systematically. Our commitment to autonomy is rooted in the imperative to bridge the gap between academia and industry.

The First Year Engineering course is a broad foundation training program to impart scientific and logical thinking Training to learners in general with a choice of course selection in the Basic sciences and Engineering Sciences. Simultaneously, objectives demand nurturing the basic skills required for familiarising within the respective chosen Branch of Engineering by the learner. Keeping this in view, in autonomy of our institute a pool of courses is offered in Basic sciences covering fundamentals required to understand modern engineering practices and emerging trends in technology. Considering the change in pedagogy and the convenience of the stress-free learning process, in the course work under heads of Engineering Sciences, a choice-based subject pool is offered in the first semester as BEEE and the Digital system to familiarise the students with the basics of computers and fundamentals of electronics. and electrical engineering.

Essentially to give a glimpse of trends in the industry under vocational skill practices, subjects like C-Programming and Python Programming are offered to nurture and develop creative skills in contemporary industrial practices

Basic sciences cover Applied Mathematics as a compulsory subject and a pool of subjects are given for selection including Applied Chemistry, Applied Chemistry, Energy Science, Material Science & Biology for Engineers,. Ability enhancement can be achieved in Undergraduate training by giving an objective viewpoint to the learning process and transitioning a learner from a rote learner to a creative professional, for the purpose. Professional Communication and Ethics as well as branch specific workshops are introduced in the First Year to orient a journey learner to become a skilled professional. Considering the NEP-2020 structure of award of Certificate & Diploma at multiple exit-point pools of Vocational skills is arranged for giving exposure to the current Industry practices. For the holistic development and acquaintance of Indian culture of students, universal human values and Indian Knowledge system introduced in the first year engineering curriculum.

As per NEP 2020 guidelines for the curriculum framework of higher technical education for UG courses, Environmental Science for Engineers is introduced. To develop soft skills, and social, physical, mental, spiritual personality through carefully articulated Liberal Learning / Co-curricular courses are introduced and selection of the course is as per bucket provided.

Faculty resolved that course objectives and course outcomes are to be clearly defined for every subject so that all faculty members in our higher education institute understand the depth and approach of the course to be taught, which will enhance the learner's learning process.

There was a concern that in the present system, the first-year syllabus must not be heavily loaded to the learner, so the autonomy of our institute focuses on lowering the burden of syllabus and credits in order to ease the learning process. The present curriculum will be implemented for the First Year of Engineering from the academic year 2025-26. Subsequently, this system will be carried forward for Second Year Engineering in the academic year 2026-27, and for Third Year and Final Year Engineering in the academic years 2027- 28, and 2028-29, respectively.

Dr. Sandhya Mathur	**Dr. V.P. Patil**	**Dr. Sunil Chavan**
Chairperson, Board of Studies	**Dean Academics**	**Chairperson, Academic Council**

Table 1: Content

Table 2: Nomenclature of the course in the curriculum

Abbreviations	Course Category
BSC	Basic Science Course including Mathematics
ESC	Engineering Science Course
VEC	Value Education Course
AE	Ability Enhancement Course
VEC	Value education course
IKS	Indian Knowledge System Course
CC	Co curricular course
VSEC	Vocational and Skill Enhancement Course

.

Table 3: Program Structure for First Year Engineering Scheme Name : SIGCE25R0

Semester I

Course Code	Course Category	Course Description	Course Choice	Teaching Scheme (Contact Hours)					Credit Assigned			
				L	T	P	SL	TE	L	T	P	Total Credits
ASBS111	BSC	Applied Mathematics-I	compulsory	3	1		4	8	3	1	-	4
ASBS112	BSC	Applied Physics	Any one from bucket	2	-	2	2	6	2	-	1	3
ASBS113		Applied Chemistry		2	-	2	2		2	-	1	3
ASBS114		Energy Science /		2	-	2	2		2	-	1	3
ASBS115		Material Science/		2	-	2	2		2	-	1	3
ASBS116		Biology for Engineers		2	-	2	2		2	-	1	3
ASES111	ESC	Engineering Mechanics	compulsory	2	-	2	2	6	2	-	1	3
ASES112	ESC	Basic Electrical & Electronics	Any one from bucket	2	-	2	2	6	2	-	1	3
ASES113	ESC	Digital System		2	-	2	2		2	-	1	3
ASAE111	AEC	Professional Communication and Ethics	Any one from bucket	-	-	2*+2	-	4	-	-	2	2
ASAE112	AEC	Engineering Workshop		-	-	2*+2	-		-	-	2	2
ASVSC111	VSES	C Programming	compulsory	-	-	2*+2	-	4	-	-	2	2
ASVE111	VEC	Universal Human Values	Any one from bucket	-	-	2*+2	-	4	-	-	2	2
ASHS111	HSSM	Indian knowledge System		-	-	2*+2	-		-	-	2	2
ASCC111x	CC	Co Curricular Course-1	compulsory	-	-	2#	-	2	-	-		1
Total				**9**	**1**	**20**	**10**	**40**	**9**	**1**	**10**	**20**

SL = Lecture, T = Tutorial, P = Practical, SL= Self Learning, TE = Total Engagement Hours

* Two hours of practical class to be conducted for full class as demo/discussion

Course evaluation is activity-based which may be individual or group of four students.

As per New National Credit Framework 1 Cr is equivalent to 30 Hrs of Total Engagement Hours (TE).

Notional Engagement Weeks per Semester = 15 weeks (approx.) which includes Internal Assessments.

CC = Co-Curricular Courses -1 (Any one of the following)

1. social science and community services
2. Health, wellness and mindfulness
3. Basics of Photography and visual communication
4. Video editing
5. Healthy Cooking & Nutrition.

Table 4: Program Structure for First Year Engineering Scheme
Name: SIGCE25R0

Semester II

Course Code	Course Category	Course Description	Course Choice	Teaching Scheme (Contact Hours)					Credit Assigned			
				L	T	P	SL	TE	L	T	P	Total Credits
ASBS121	BSC	Applied Mathematics-II	Compulsory	3	1	--	4	8	3	1	--	4
ASBS112	BSC	Applied Physics	Any One from the bucket	2	-	2	2	6	2	-	1	3
ASBS113		Applied Chemistry		2	-	2	2		2	-	1	3
ASBS114		Energy Science		2	-	2	2		2	-	1	3
ASBS115		Material Science		2	-	2	2		2	-	1	3
ASBS116		Biology for Engineers		2	-	2	2		2	-	1	3
ASES121	ESC	Engineering Graphics	Compulsory	1	-	2	1	4	1	-	1	2
ASES122	ESC	Environmental science for Engineer	Compulsory	2	-			2	2			2
CEPC121	PCC	Data Structure	Computer Engineering & allied branches	2	-	2	2	6	2		1	3
EEPC122		Elements of Electrical Engineering	Electrical	2	-	2	2		2		1	3
MEPC123		Elements of Mechanical Engineering	Mechanical	2	-	2	2		2		1	3
ASAE111	AEC	Professional and Communication Ethics	Any One from the bucket	--	-	2*+2	-	4	--	-	2	2
ASAE112		Engineering Workshop			-	2*+2	-				2	
ASVS122	VSEC	Python Programming	Compulsory	-	-	2*+2	2	6	-	-	2	2
ASVE111	VEC	Universal Human Values	Any one from bucket	-	-	2*+2	-	4	-	-	2	2
ASHS111	HSSM	Indian knowledge System		-	-	2*+2	-		-	-	2	2
ASCC112xx	CC	Co Curricular Course-II	Compulsory	-	-	2#		2	-	-	1	1
Total				**10**	**1**	**14**	**17**	**42**	**10**	**1**	**10**	**21**

L = Lecture, T = Tutorial, P = Practical, SL= Self Learning, TE = Total Engagement Hours

* Two hours of practical class to be conducted for full class as demo/discussion

Course evaluation is activity-based which may be individual or group of four students.

As per New National Credit Framework 1 Cr is equivalent to 30 Hrs of Total Engagement Hours (TE).

Notional Engagement Weeks per Semester = 15 weeks (approx.) which includes Internal Assessments.

PCC = Program Core Course

Computer Engineering CSE (AI & ML), CSE(AIDS), CSE (IoT & CSBT)

- Data Structure.

Electrical Engineering

- Elements of Electrical Engineering.

Mechanical Engineering

- Elements of Mechanical Engineering.

First Year SEM-I Evaluation Scheme (Percentage)

Sr. No.	Course Code	Course Name (Theory / Continuous Assessment Test (CAT)) / Course Name (Practical)	Credits	IA1(%)	IA2(%)	TA (%)	ESE (%)	Total(%)
				ACT / Exp %	Quiz / CS %	A %		
1	ASBS111	Applied Mathematics-I	3	15	15	10	60	100
		Applied Mathematics-I Lab	1	60	15	15	10	100
2	ASBS112	Applied Physics	2	15	15	10	60	100
		Applied Physics Lab	1	30	30	20	20	100
3	ASBS113	Applied Chemistry	2	15	15	10	60	100
		Applied Chemistry Lab	1	30	30	20	20	100
4	ASBS114	Energy Science	2	15	15	10	60	100
		Energy Science Lab	1	30	30	20	20	100
5	ASBS115	Material Science	2	15	15	10	60	100
		Material Science Lab	1	30	30	20	20	100
6	ASBS116	Biology for Engineers	2	15	15	10	60	100
		Biology for Engineers Lab	1	30	30	20	20	100
7	ASES111	Engineering Mechanics	2	15	15	10	60	100
		Engineering Mechanics-Lab	1	20	20	10	50	100
8	ASES112	Basic Electrical Engineering-Theory	2	15	15	10	60	100
		Basic Electrical Engineering - Lab	1	20	20	10	50	100
9	ASES113	Digital System	2	15	15	10	60	100
		Digital System-Lab	1	20	20	10	50	100
10	ASAE111	Professional Communication and Ethics	2	30	30	20	20	100
11	ASAE112	Engineering Workshop	2	40	--	10	50	100

12	ASVSC111	C Programming	2	20	20	10	50	100
13	ASVE111	Universal Human Values	2	30	30	20	20	100
14	ASHS111	Indian knowledge System	2	30	30	20	20	100
15	ASCC111	Co-Curricular Course-1	1	30	30	20	20	100

- Assessment Tools (Theory)

  IA-I and IA-2 (Internal Assessment)
  - Written Test / Paper – Pencil/Pen

- Teaching Assessment (TA) Tools
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
  - Case study
- ESE- End Sem Exam
- TW- Term Work

- Assessment Tool (Practical)

  - ACT – Activity
  - CS – Case Study
  - A – Attendance

Note* - 40% passing is compulsory for each head i.e., CAT (Continuous Assessment Test), ESE (End Semester Examination) and practical (Tearm Work and oral)

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First Year SEM-II Evaluation Scheme (Percentage)

Sr. No.	Course Code	Course Name (Theory / Continuous Assessment Test (CAT)) / Course Name (Practical)	Credits	IA1(%) / ACT / Exp %	IA2(%) / Quiz / CS %	TA (%) / A %	ESE (%)	Total(%)
1	ASBS121	Applied Mathematics-II	3	15	15	10	60	100
		Applied Mathematics-II Lab	1	60	15	15	10	100
2	ASBS112	Applied Physics	2	15	15	10	60	100
		Applied Physics Lab	1	30	30	20	20	100
3	ASBS113	Applied Chemistry	2	15	15	10	60	100
		Applied Chemistry Lab	1	30	30	20	20	100
4	ASBS114	Energy Science	2	15	15	10	60	100
		Energy Science Lab	1	30	30	20	20	100
5	ASBS115	Material Science	2	15	15	10	60	100
		Material Science Lab	1	30	30	20	20	100
6	ASBS116	Biology for Engineers	2	15	15	10	60	100
		Biology for Engineers Lab	1	30	30	20	20	100
7	ASES121	Engineering graphics	2	20	20	10	50	100
8	ASES122	Environment science for engineers	2	15	15	10	60	100
9	CEPC121	Data Structure	2	15	15	10	60	100
		Data Structure -Lab	1	20	20	10	50	100
10	EEPC122	Elements of Electrical Engineering	2	15	15	10	60	100
		Elements of Electrical Engineering-Lab	1	20	20	10	50	100
11	MEPC123	Elements of Mechanical Engineering	2	15	15	10	60	100

		Elements of Mechanical Engineering-Lab	1	20	20	10	50	100
12	ASAE111	Professional Communication and Ethics	2	30	30	20	20	100
13	ASAE112	Engineering Workshop	2	40	--	10	50	100
14	ASVSC121	Python Programming	2	20	20	10	50	100
15	ASVE111	Universal Human Values	2	30	30	20	20	100
16	ASHS111	Indian knowledge System	2	30	30	20	20	100
17	ASCC111	Co-Curricular Course-II	1	30	30	20	20	100

- Assessment Tools (Theory)

  IA-I and IA-2 (Internal Assessment)
  - Written Test / Paper – Pencil/Pen

- Teaching Assessment (TA) Tools
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
  - Case study

- Assessment Tool (Practical)

  - ACT – Activity
  - CS – Case Study
  - A – Attendance

Note* - 40% passing is compulsory for each head i.e., CAT (Continuous Assessment Test), ESE (End Semester Examination) and practical (Tearm Work and oral)

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASBS111	BSC	Applied Mathematics-I	03	01	--	04	08	3	1	--	4

Course Code	Course Description	Examination Scheme						
			Continuous Assessment Tests (CAT)					
ASBS111	Applied Mathematics-I	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	3
		Laboratory	Tutorials %	Scilab %	Attendance %	ESE		
			60	15	15	10	100	1

Course Objectives:

1. To develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands-on experience using SCILAB software to handle applications to real-life problems.

Course Outcomes:

Code	Course Outcomes At the end of the course student will be able to	Bloom's Level
ASBS111.1	Apply the basic concepts of Complex Numbers to solve engineering problems.	L3
ASBS111.2	Apply hyperbolic functions and logarithms of complex numbers to analyse engineering problems.	L4
ASBS111.3	Apply the concepts of partial differentiation of function of several variables to solve complex engineering problems.	L3
ASBS111.4	Apply the concepts of Maxima, Minima, and Successive differentiation for optimization of complex engineering problems.	L3
ASBS111.5	Apply the concepts of Matrices to solve Complex engineering problems.	L3
ASBS111.6	Apply the concepts of Numerical Methods for solving engineering problems with help of SCILAB software.	L3

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
I	**Complex Numbers**	**Prerequisite:** Review of Complex Numbers-Algebra of Complex Numbers, Cartesian, polar and exponential form of complex number, Statement of De Moivre's Theorem. 1.1 Expansion of $\sin^n\theta$, $\cos^n\theta$ in terms of sines and cosines of multiples of θ and Expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$. 1.2 Powers and Roots of a complex number.	**03** **03**	**CO1**
II	**Hyperbolic Functions & Logarithms of Complex Numbers**	2.1 Circular functions of complex numbers and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic Functions. Separation of real and imaginary parts of all types of Functions. (Simple Examples) 2.2 Logarithm of Complex Number (Simple Examples) Seperation of real and imaginary parts of a complex number.	**04** **03**	**CO2**
III	**Partial Differentiation**	3.1 Partial Differentiation: Function of two and three variables, Partial derivatives of first and higher order. Differentiation of composite function. 3.2 Euler's Theorem on Homogeneous functions with two independent variables (with proof). Deductions from Euler's Theorem (without proof). **# Self-learning topics:** Total differentials, implicit functions, Euler's Theorem on Homogeneous functions with three independent variables.	**03** **03**	**CO3**

IV	**Applications of Partial Differentiation and Successive Differentiation.**	4.1 Maxima and Minima of a function of two independent variables, 4.2 Successive differentiation: nth derivative of standard functions. Leibnitz's Theorem (without proof) and simple examples. Lagrange's Multiplier method of undetermined Multiplier. **# Self-learning topics:** Jacobian of two and three independent variables (simple problems)	**03** **04**	**CO4**
V	**Matrices**	**Pre-requisite:** Inverse of a matrix, addition, multiplication, and transpose of a matrix, symmetric, skew-symmetric Matrix (Only Definition). 5.1 Types of Matrices (Hermitian, Skew Hermitian, Unitary, Orthogonal Matrices and properties of Matrices (without proof)). The rank of a Matrix using Echelon form, reduction to normal form and PAQ form (Only 3X3 Matrix) 5.2 System of homogeneous and non-homogeneous equations, their consistency and solutions. 5.3 Application of inverse to coding theory. **# Self-learning topics:** Reduction to normal form and PAQ form (m x n Matrix)	**03** **03** **01**	**CO5**
VI	**Numerical Solutions of Transcendental Equations and System of Linear Equations and Expansion of Function.**	6.1 Solution of Transcendental Equations: Solution by Newton Raphson method and Regula –Falsi method. (All without proof) 6.2 Solution of a system of linear algebraic equations, by (1) Gauss Jacobi Iteration Method, (2) Gauss Seidel Iteration Method. (All without proof) 6.3 Indeterminate forms, L- Hospital Rule $(\infty/\infty, 0/0, 0*\infty, \infty-\infty)$ **# Self-learning topics:** Gauss Elimination Method, Gauss Jordan Method	**02** **02** **02**	**CO6**
Total			**39**	.

Text Books:

1. A textbook of Applied Mathematics Vol-I & Vol-II by P. N. Wartikar & J.N. Wartikar.
2. A textbook of Engineering Mathematics by N.P. Bali & Manish Goyal. Laxmi Publication.

References:

1. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9thEd.
3. Engineering Mathematics by Srimanta Pal and Subodh, C.Bhunia, Oxford University Press
4. Matrices, Shanti Narayan, S. Chand publication.
5. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill
6. Elementary Linear Algebra with Application by Howard Anton and Christ Rorres. 6th edition.John Wiley & Sons, INC.
7. Numerical methods by Dr. P. Kandasamy ,S.Chand Publications

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 marks each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** need to be answered

Term Work:

A) Term Work shall consist of 6 tutorials on entire syllabus and 4 scilab tutorials based on Numerical Solution of Transcendental Equations by using 1) Newton Rap son method ,2) Regular –Falsi method and Numerical solution of a system of linear algebraic equations, by (1) Gauss Jacobi Iteration Method, (2) Gauss Seidel Iteration Method

B) Batch wise tutorials are to be conducted. The number of students per batch should be as per university pattern for practical.

C) Students must be encouraged to write SCILAB Programs in tutorial class only.

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASBS112	BSC	Applied Physics	02	--	02	02	06	2	--	1	3

Course Code	Course Description		Examination Scheme					
			Continuous Assessment Tests (CAT)					
ASBS112	Applied Physics	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			30	30	20	20	100	1

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Objectives:

1. To build a foundation of quantum mechanics needed for modern technology.
2. To Understand Lasers and Optical fibre principles in communication technology.
3. To give exposure to the concept of Fermi level in semiconductor**s.**
4. To give exposure to the superconductor's technology.
5. To understand the significance of solid-state sensors.
6. To understand the exposure of physics in the upcoming field of Nanotechnology.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASBS112.1	Learners will be able to RELATE the foundations of quantum mechanics with the development of modern technology.	**L4**
ASBS112.2	Learners will be able to ILLUSTRATE the use of lasers and RELATE the role of fibre optics in modern technology.	**L3**
ASBS112.3	Learners will be able to CLASSIFY semiconductors and EXPLAIN variation of Fermi level with temperature and impurity concentration.	**L4**
ASBS112.4	Learners will be able to CLASSIFY superconductors and their uses for magnetic levitation.	**L4**
ASBS112.5	Learners will be able to EXAMINE the use of appropriate sensors for the application.	**L4**
ASBS112.6	Learners will be able to IMPLEMENT knowledge learned here to nano measurements.	**L4**

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5:Evaluate	L6: Create

SYLLABUS DETAILED:

Sr. No.	Module	Detailed Content	Hours	CO Mapping
I	**Quantum Physics**	Properties of matter waves, wave packet, phase velocity and group velocity; Wave function and its physical interpretation. Heisenberg uncertainty principle; Non existence of electron in nucleus, Schrödinger's time independent and time dependent equations, Energy of a particle enclosed in a rigid box and related numerical problems, principles of Quantum tunneling and quantum computation.	**06**	**CO1**

II	**Lasers and Fibre Optics**	Lasers: Laser principles, metastable state, population inversion, pumping, resonant cavity. Construction and working of He-Ne laser and Fiber laser. Application of laser :(i) Barcode reader (ii) Metal work. Optical fibers: Critical angle, acceptance angle, acceptance cone, numerical aperture, total internal reflection and propagation of light, Types of optical fibers: step index & graded index fibres. Single mode & multimode fibers. Attenuations.	**05**	**CO2**
III	**Physics of Semiconductor**	Direct and Indirect Band Gap Semiconductors, Fermi-Dirac distribution function, Position of Fermi Level in Semiconductors. Effect of temperature on Fermi level in Semiconductors. Effect of impurity concentration on Fermi level in Semiconductors. I-V characteristics and application of PN Junction diode and Zener diode.	**04**	**CO3**
IV	**Superconductivity**	Superconductivity: Critical temperature, Critical magnetic field, Meissner Effect, Cooper pair, Isotope Effect, Energy gap in semiconducting state and its temperature dependence. Types of Superconductors. Applications: SQUIDs and MAGLEV.	**03**	**CO4**
V	**Physics of Sensor**	Hall sensor: Construction, working and its uses for measurement of magnetic field. Ultrasonic Sensors: Construction, working and its uses for Distance Measurement. Optical sensor: Construction, working and its uses for ambient light measurement and flux measurement.	**04**	**CO5**
VI	**Nanotechnology**	Introduction to Nanotechnology, Properties (optical, Electrical) of Nanomaterials, Importance of surface to Volume ratio. Van Der waals interactions, Name and explain synthesis methods of nano particles in details. Scanning Electron	**04**	**CO6**

		Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM)		

Text Books:

1. A Textbook of Engineering Physics -Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar, S. Chand, Revised Edition 2014

2. Modern Engineering Physics - A. S. Vasudeva, S. Chand, Revised Edition 2013

3. Engineering Physics D. K Bhattacharya, Poonam Tandon, Oxford Higher Education, 1st Edition 2015

4. Engineering Physics -R. K. Gaur, S. L. Gupta, Dhanpat Rai Publications, 2012

5. Engineering Physics -V. Rajendran, McGraw Hill Educations, 2017

6. Introduction-Superconductivity, 2nd edn, ,by Michael Tinkham, 2004

7. Handbook of Modern Sensors Physics design and application-Jacob Fraden, Springer, AIP press.

8. A Textbook of Nanoscience and Nanotechnology, T. Pradeep Tata McGraw Hill Education Pvt. Ltd.2012

9. Advances In Nano Materials And Applications: History of Nanotechnology From Prehistoric to Modern Times, Madhuri Sharon, Wiley, USA.

10. Nano: The essentials, understanding Nanoscience and Nanotechnology, T. Pradeep, Tata McGraw Hill, 2007.

References:

1. Quantum Physics, Gasiorowicz Stephen, 3rd edn ,Wiley publication.

2. Physics of Semiconductor Devices, Simon M. Sze, Yiming Li, Kwok K. Ng, 4th Edn, John Wiley & Sons, 2021

3. Concepts of Modern Physics-Arther Beiser, Shobhit Mahajan, S. Choudhury, McGraw Hill, 7thEdn, 2017

4. Fundamentals of optics - Francis A. Jenkins, Harvey E. White, Edn 4th , McGraw Hill Publication, India

5. Fundamentals of Physics, Halliday and Resnick, Wiley publication.

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**

- Presentation
- Quiz
- Open Book Test
- Assignment

- **End Semester Theory Examination:**

Question paper format

4. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
5. Weightage of the question will be given as per the hours allotted to respective modules
6. All **questions** need to be answered

List of Experiments. (Minimum 08 experiments to be performed)

Sr No	List of Experiments	Hrs	CO Mapping
01	Determination of Planck constant using Photocell	02	CO1
02	Determination of Planck constant using LED	02	CO1
03	Determination of wavelength using of Laser beam	02	CO2
04	Determination of divergence of laser beam	02	CO2
05	Determination of Numerical Aperture of an optical fibre.	02	CO2
06	Measurement of optical power attenuation in your plastic optical fiber.	02	CO2
07	Determination of energy band gap of semiconductor.	02	CO3
08	Determine electrical conductivity or resistivity of Semiconductor	02	CO3
09	Determination of I-V characteristics of PN Junction diode and Zener diode.	02	CO3
10	Determination of Critical temperature of superconductor using simulation	02	CO4
11	Measurement of resistance of the superconducting material as a function of temperature.	02	CO4
12	Measurement of very weak magnetic fields using SQUIDs.	02	CO4
13	To observe the levitation of the magnet due to the Meissner Effect.	02	CO4

14	Measurement of distance using ultrasonic sensor	02	CO5
15	Measurement of magnetic field of solid-state material using Hall sensor	02	CO5
16	Determine the resistance of Nanomaterials in toxic gases.	02	CO6
17	Experiment based on nanotechnology using open-source simulation	02	CO6
18	Any other experiment based on syllabus may be included, which would help the learner to understand concepts. Virtual lab may be developed and used for performing the experiments, after defining a suitable LO	02	CO1 to CO6

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASBS113	BSC	Applied Chemistry	02	--	02	02	06	2	--	1	3

Course Code	Course Description		Examination Scheme					
			Continuous Assessment Tests (CAT)					
ASBS113	Applied Chemistry	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			30	30	20	20	100	1

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Objectives: The Course is aimed to:

1. Impart the student with knowledge of basic chemistry and a scientific approach t understand the energy systems.
2. To develop the abilities and skills relevant to the study of Chemistry.
3. Serve as basic tools for specialized studies in the fields of Engineering and Technology.
4. To learn important types, synthesis and uses of plastics and elastomers.

Course Outcome:

Course Outcome (CO)	Learner will be able to…	Blooms Level
ASBS113.1	Determine the quality of Coal and quantify the oxygen required for combustion of coal.	**L3**
ASBS113.2	To select various types of Lubricants for Industrial applications.	**L3**
ASBS113.3	To understand the concept of green chemistry and its application for Sustainable development.	**L2**
ASBS113.4	To analyze the quality of Water and suggest suitable methods for treatment of water	**L4**
ASBS113.5	Apply different methods to minimize corrosion in Industries	**L3**
ASBS113.6	Utilize different Plastics and elastomers in industries based on their properties.	**L3**

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

Detailed Syllabus

Module Number	Module	Detailed Content	Hours	CO
1	**Fuels**	Prerequisite: definition, Classification and characteristic of fuels. Calorific Value- Definition, types of Calorific Value; HCV and LCV, Units, Dulong's formula, Numerical. Coal- Definition, analysis of Coal, Proximate analysis- % 0f Moisture, Volatile matter, Ash, fixed carbon and their significance. Ultimate analysis- % of Carbon and hydrogen, nitrogen, Sulphur, Oxygen and their significance Combustion of Coal- Requirement of Oxygen and air on weight and volume basis.	**5**	**CO 1**

2	**Lubricants**	Definition-Lubricants and lubrication Functions of Lubricants Mechanism of lubrication: thick-film, thin-film and Extreme-pressure lubrication. Classification of lubricants: Solid, Semi-solid, Liquid and blended oils. Properties of lubricants: Viscosity and viscosity Index and significance, Flash and fire point with their significance, Cloud point and pour point and significance, Acid Value, Saponification value, Numerical on acid and saponification value.	**4**	**CO 2**
3	**Green Chemistry**	Concept of Green chemistry, 12 principles of green chemistry, Numerical on atom Economy. Conventional and Green synthesis of ; Adipic Acid, Carbaryl and Indigo. Green Solvents: Biodiesel production and Supercritical solvents: Water and Chlorine.	**3**	**CO 3**
4	**Water**	Prerequisite: Knowledge about the sources of water, possible impurities and the disadvantages. Hardness: Types of hardness, units, Numerical Determination of hardness: EDTA method, advantages, disadvantages, Numerical. Softening Method: Lime-soda method (Hot process), advantages, disadvantages, numerical. Demineralization method (Ion-exchange), advantages, disadvantages, numerical.	**5**	**CO 4**
5	**Corrosion**	Definition, Mechanism of Wet and Dry corrosion. Types of Wet corrosion: Galvanic, differential aeration, stress corrosion, pitting corrosion and intergranular corrosion. Factors affecting rate of corrosion: Nature of metal and Nature of corroding environment. Methods for prevention of Corrosion: Cathodic protection: Sacrificial and impressed current method. Metallic coatings: tinning and galvanizing.	**4**	**CO 5**
6	**Polymers**	Prerequisite: Polymerization, Monomers. Degree of polymerization. Molecular weight of Polymer- Number Average molecular weight and weight average molecular weight, numerical. Polymer crystallinity- Glass transition temperature, Viscoelasticity. Introduction to Plastics- Thermo softening and Thermosetting Plastics, Compounding of plastics, Synthesis, properties and uses of : PMMA, Kevlar and Phenol formaldehyde.	**5**	**CO 6**

		Introduction to Rubber- Natural Rubber, drawbacks, Compounding of rubber, Vulcanization. Synthesis, properties and uses of: Silicon rubber, Polyurethane rubber and Buna-S rubber. Introduction to Conducting Polymers, examples and applications.		

Textbook:

1. A Textbook of Engineering Chemistry by S.Dara, 2041 Edition, Chand Publication.
2. Engineering Chemistry by Jain and Jain, 17th edition, 2018, Dhanpatrai Publications.
3. A Textbook of Chemistry by Shashi Chawla, first Edition, 2019, Dhanpatrai and Co.
4. A Textbook of Green Chemistry by AK Ahluwalia, 2008, Ane Book India.

References:

1. Textbook of Polymer Science: F.W.Billimeyer
2. Fundamentals of Engineering science and Engineering- Anilkumar and S.K.Gupta, Tata McGraw Hill

Online References:

1. https://www.iehe.ac.in/PDF/News/2024/NPTEL_Course_list.pdf
2. https://onlinecourses.swayam2.ac.in/nce19_sc15/preview

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** needs to be answered

Module	Detailed Content	No of Hours	Course outcome
1	Determination of Moisture content in given coal sample.	2	CO 1
2	Determination of Fuel gas in given sample by Orsat apparatus	2	CO1
3	Determination of Viscosity of the oil by RedWood Viscometer	2	CO 2
4	Determine the Acid Value/Saponification value of the given oil sample.	2	CO 2
5	Preparation of Biodiesel from Edible oil	2	CO 3
6	Determination of Hardness present in given water sample by EDTA method.	2	CO 4
7	Determination of chloride content present in the given water sample	2	CO 4
8	Determination of rate of corrosion in the given metal samples.	2	CO 5
9	Determination of pH of the different samples using pH meter.	2	CO 5
10	Synthesis of Phenol formaldehyde	2	CO 6
11	Synthesis of Urea Formaldehyde	2	CO 6

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASBS114	BSC	Energy Science	02	--	02	02	06	2	--	1	3

Course Code	Course Description		Examination Scheme					
			Continuous Assessment Tests (CAT)					
ASBS114	Energy Science	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			30	30	20	20	100	1

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Objective:

1. To provide students with a comprehensive understanding of various energy sources, their utilization, and emerging technologies, enabling them to analyze and design efficient energy systems for sustainable development.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASBS114.1	Understand the fundamental concepts of energy and energy transformations	L2
ASBS114.2	Understanding the Chemistry of nuclear reactions	L2

ASBS114.3	Understand and analyze the solar energy principles, technologies, and their applications in renewable energy systems	L4
ASBS114.4	To understand and analyze the combustion mechanism of various conventional fuels and introduction to alternative fuels.	L2
ASBS114.5	Understand the fundamentals of renewable sources like wind, biomass, geothermal, and tidal energy.	L2
ASBS124.6	To acquire knowledge of different battery technology and understand the basic mechanism allowing electrochemical energy storage in batteries.	L2

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5:Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
I	**ENERGY & ITS USAGE**	Definition and forms of energy (kinetic, potential, thermal, chemical, electrical, nuclear) - Law of conservation of energy - Energy transformation and transfer - Energy consumption patterns (global and local) - Efficiency and energy conservation methods - Environmental impact of energy usage	**04**	**CO1**
II	**NUCLEAR ENERGY**	Fundamental forces in the universe, Nuclear forces, energy scales and structure Nuclear reactors: types and working principles - Nuclear fuel cycle and waste management Applications of nuclear energy (power generation, medicine, industry) - Safety measures and environmental concerns	**03**	**CO2**

III	**SOLAR ENERGY**	Introduction to solar energy, fundamentals of solar radiation & its measurement aspects; - Basic physics of semiconductors, - Carrier transport, - generation & recombination in - Solar power technologies: solar cells, solar thermal collectors, solar heaters - Applications of solar energy (electricity, heating, desalination) - Advantages and limitations of solar energy - Recent advancements and future trends	**05**	**CO3**
IV	**CONVENTIONAL ENERGY SOURCES**	Definition of Conventional energy, What are fuels, Types of fuels, Characteristics of fuels. Calorific value of a fuel - HCV and LCV, Units of Calorific value, Theoretical determination of calorific value of fuel by Dulong's formula, Numerical problems Coal - Definition and Ranking, Analysis of coal - Proximate and Ultimate analysis, Numerical problem Crude oil - Classification, Fuels for Internal Combustion Engines - Knocking. Octane number, Anti Knocking agents, Cetane number. Alternative Fuels: Biodiesel and Hydrogen as green fuel. Combustion of fuels - Numerical problems for calculating the amount of air needed for the complete combustion of solid and gaseous fuels.	**05**	**CO4**
V	**NON-CONVENTIONAL ENERGY SOURCES**	Need of non-conventional energy sources. Renewable sources of energy such as Hydro, Solar, Wind. Non-conventional sources: wind, biomass, geothermal, hydroelectric, tidal - Comparison of energy sources: availability, cost, environmental impact - Biological energy sources and fossil fuels - Sustainable energy development and renewable energy policies - Wind turbine dynamics and design, - wind farms, - Geothermal power and ocean thermal energy conversion, - Tidal / wave/ hydropower. - Introduction to EMV(electric motor vehicle)	**5**	**CO5**

VI	**Battery Technology**	Battery- classification - primary, secondary and reserve batteries. Characteristics-Capacity, Electricity storage density, energy efficiency, cycle life and shelf life. Construction, working, applications and limitations of Lead acid storage battery, Modern Batteries - Lithium and Lithium ion batteries and its applications. Fuel Cells: Introduction, classification of fuel cells, limitations & advantages of fuel cells, Construction of Hydrogen oxygen alkaline fuel cells. Introduction to working of cell phone battery.	**04**	**CO6**
Total			**26**	

Text Books:

1. Engineering Mechanics by A K Tayal, Umesh Publication.
2. Engineering Mechanics by Kumar, Tata McGraw Hill
3. Engineering Mechanics by Beer &Johnston, Tata McGraw Hill
4. Engineering resources: Conventional and Non-conventional by R.K Rajput.

References:

1. 1. Andrews, J., & Jelley, N. (2017). Energy Science: Principles, Technologies, and Impacts (3rd ed.). Oxford University Press.
2. Khan, B. H. (2017). Non-Conventional Energy Resources (3rd ed.). McGraw Hill Education.
3. Sukhatme, S. P., & Nayak, J. K. (2008). Solar Energy: Principles of Thermal Collection and Storage (3rd ed.). Tata McGraw Hill.
4. Twidell, J., & Weir, T. (2015). Renewable Energy Resources (3rd ed.). Routledge.
5. Murray, R. L. (2014). Nuclear Energy: An Introduction to the Concepts, Systems, and Applications of Nuclear Processes (7th ed.). Butterworth-Heinemann.
6. Murphy, W. R., & McKay, G. (1987). Energy Management. Butterworth-Heinemann

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment

- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** need to be answered

List of Case Studies/ Reports:

Sr No	List of Experiments	Hrs	CO mapping
1	Case Study on Global vs Indian Energy Consumption Trends	**2**	**CO1**
2	Comparative Analysis of Different Types of Nuclear Reactors	**2**	**CO2**
3	Design Evaluation of a Rooftop Solar PV System for a Home or College	**2**	**CO2, CO4**
4	Case Study on a Thermal Power Plant vs Wind Energy Plant (Efficiency & Impact)	**2**	**CO3**
5	Energy Audit of a Classroom/Office Space (Hypothetical or Real Data)	**2**	**CO4**
6	Report on Hybrid Energy Systems (e.g., Solar + Wind + Battery Storage)s	**2**	**CO4, CO5**
7	Environmental Impact Report: Nuclear vs Renewable Energy Systems	**2**	**CO3**

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASBS115	BSC	Material Science	02	--	02	02	06	2	--	1	3

Course Code	Course Description		Examination Scheme					
			Continuous Assessment Tests (CAT)					
ASBS115	Material Science	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			30	30	20	20	100	1

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Objective:
To make learners understand the fundamental physical origins of material behaviour to optimize the properties for various engineering materials.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASBS115.1	Apply the knowledge of the basics of crystallography.	L3

ASBS115.2	Classify the various magnetic materials and identify the magnetic materials for various engineering applications.	L2
ASBS115.3	Understand the basics of physics and chemistry on the nanomaterial and composite materials	L2
ASBS115.4	Understand the fundamentals of smart materials	L2
ASBS115.5	Understand the mechanical properties of materials comprehend behavior of material under stress and strain	L2
ASBS115.6	Understand modern materials	L2

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5:Evaluate**	**L6: Create**

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
I	**Crystallography**	Introduction, types of solids, space lattice, basis, unit cell and its characterization, lattice parameters (FCC, BCC, HCP, Diamond and NaCL) Crystal imperfections: Point and Line defects (Vacancies, Interstitials, Impurities, Dislocations) - Impact of Defects on Material Properties Numerical on lattice parameter	**05**	**CO1 &CO2**

II	**Magnetic properties of materials**	Introduction, magnetic moment of an atom, useful magnetic parameters Classification of magnetic materials - Diamagnetic materials - Paramagnetic materials - Ferromagnetic materials Hysteresis definition and characteristics, soft and hard magnetic materials and their applications	**04**	**CO3**
III	**Nanomaterials and t Composite Materials**	Introduction, types of nanostructured materials - Molecular self-assemblies, and Applications Types of Composites, applications - Fibre-reinforced composites- e.g., Glass fibre composite - Layered composite - Particulate composite: - large particle and dispersion strengthened composite	**05**	**CO4**
IV	**Modern, Smart and Intelligent Engineering Materials**	- Introduction, distinguish features of smart materials, Types of smart materials and their various engineering applications - Dielectric materials: polarization, temperature and frequency effects, electric breakdown, ferroelectric materials and its various applications - Metallic glasses and their various engineering applications - Wide-bandgap (WBG) semiconductors: Silicon Carbide, Gallium nitride. Applications of WBG materials	**06**	**CO5**
V	**Mechanical Properties of Materials**	Introduction to Mechanical Properties, Factors Influencing Mechanical Properties, Elastic, Anelastic & Viscoelastic behaviour - Engineering Stress & Strain relationship - True Stress & Strain - Types of Stress - Hooke's Law - Stress-Strain Diagram - Review of mechanical properties Numerical on stress strain and constants.	**05**	**CO6**

VI	**Self Study**	Current research in Engineering materials	**01**	
Total			**26**	

Text Books:

1. Electrical Engineering Materials byA.J. Dekker ,Prentice- Hall India
2. Nanotechnology: Principles and practices by Sulbha K. Kulkarni, Springer

References:

1. Solid State Physics byS.O.Pillai,New Age International
2. Materials Science and Engineering by V. Raghavan , PHI
3. Fundamentals of Materials science and engineering; an integrated approach by William Callister and Jr. David Rethwisch, John Wiley & Sons.
4. Engineering Physics by B.K. Pandey and S. Chatur, Cengage

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** need to be answered

List of Experiments:

Minimum six experiments from the following list

Sr No	List of Case Studies / Reports	Hrs	CO mapping
01	Study of HCP NaCl lattice structure	**2**	**CO1**
02	Study of miller indices	**2**	**CO2**
03	Study of nanomaterial and composite materials	**2**	**CO5**
04	Case study on smart materials and their various engineering applications	**2**	**CO3**

05	Case study on stress strain diagram of ductile and brittle material	**2**	**CO4**
06	Report on current research in Engineering materials	**2**	**CO3**
07	Report on Wide-bandgap (WBG) semiconductors	**2**	**CO5**

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASBS116	BSC	Biology for Engineers	02	--	02	04	06	2	--	1	3

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Objectives: The Course is aimed to:

Course Code	Course Description		Examination Scheme					
ASBS116	Biology for Engineers		Continuous Assessment Tests (CAT)					
		Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			30	30	20	20	100	1

1. To introduce the students to the basic concepts of biological systems.
2. To help the students have a multidisciplinary approach for the biological systems with Artificial Intelligence.
3. To help in understanding the application of technology for challenges in biological systems.
4. To understand how engineering is playing an important role in healthcare and biomedicine

Course Outcome :

Course Outcome (CO)	Learner will be able to…	Blooms Level
ASBS116.1	Understand the relation between biology and engineering.	L2

ASBS116.2	Understand the bio-molecules and their applications.	**L2**
ASBS116.3	Understand the relation between the organs and machines.	**L2**
ASBS116.4	Understand the concept of bio engineering.	**L2**
ASBS116.5	Appraise the applications of biological processes through the Engineering interventions	**L3**

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

Detailed Syllabus

Module Number	Module	Detailed Content	Hours	CO
1	**Biology for Engineers**	Contribution of Engineering in biological domain- Contribution of Microscopes, imaging techniques,basics of medical imaging modalities, bio-medical instruments. Role of biology in next generation technology development- bio signals such as ECG, EEG, EMG and their characteristics.Introduction of AI in Bio-medical applications.	**5**	**CO 1**
2	**Biomolecules as Living Machines**	Engineers of Living Machines Biomolecules and manufacturing of Biopolymers: · Carbohydrates (structure-based function and engineering applications) · Lipids (structure-based function and engineering applications) · Proteins (structure-based function and engineering applications) · Nucleic Acids (structure-based function and engineering applications) Organization of life forms: Cell to organism Bioenergetics- Energy dynamics in biological system- principles of energy conservation and optimization.	**6**	**CO 2**

3	**Organs and Technology**	Organ & system: Brain & CPU, Eye & Camera, Kidney & Filtration system, Lungs & purification system, Heart & Pumping system Process: Photosynthesis & solar cells, Xylem & plumbing, Thermoregulation in human body & heat transfer in machine, Defense mechanism in organism, signaling processing in biology and electronics.	**5**	**CO 3**
4	**Introduction to bio-Engineering**	Biomechanics: Mechanical properties of tissues, Prosthesis and rehabilitation Bioprinting techniques: 3D printing of biological tissues and organ engineering, transplanting. Biomaterials: Types, properties and applications Tissue Engineering: Principle, Components, Methods of Scaffold synthesis, properties and applications.	**5**	**CO 4**
5	**Applications of bioengineering**	Databases & Biocomputing: Acquisition, storage, processing and transmission of biological data and its applications like PCR Bioinstrumentation: Diagnostic and Therapeutic devices Bio-medical imaging: Principle, types and examples Biosensors: Principle, types and examples.	**5**	**CO 5**

Textbooks :

1. Susan Hockfield (2019) The Age of Living Machines – How Biology Will Build the Next Technology Revolution.

2. Eggins BR. (1006) Biosensors: An Introduction. John Wiley & Sons Publishers.

References:

1. Lehninger, A. L., Nelson, D. L., & Cox, M. M. (2000). Lehninger principles of biochemistry. New York: Worth Publishers.

2. Lewin B. (2000) Genes VII. Oxford University Press.

3. Rao CNR, et.al. Chemistry of Nanomaterials: Synthesis, Properties and Applications.

4. Palsson B.O. and Bhatia S.N. (2009) Tissue Engineering. Pearson.

Online References :

1. https://onlinecourses.nptel.ac.in/noc19_ge31/preview
2. https://www.bing.com/videos/riverview/relatedvideo?q=online+nptel+courses+for+engineering+biology&mid=07C5525BB5DEB0E659F807C5525BB5DEB0E659F
3. https://www.bing.com/videos/riverview/relatedvideo?q=online+nptel+courses+for+engineering+biology&mid=A028469628F5BAA84C0CA028469628F5BAA84C0C&FORM=

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** need to be answered

DETAILED SYLLABUS:

Sr. no	Content	Hrs	CO
1	Case Study-- biomechanics in biomedical engineering.	1	CO1
2	Report--How to create organs in the lab using Tissue Engineering.	1	CO2
3	Report--Biomaterials for biomedical applications.	1	CO3
4	Report--3D printing in biomedical applications	1	CO4
5	Case study--Investigating the potential of stem cell therapy in regenerative medicine for spinal cord injuries	1	CO5
6	Application of Artificial Intelligence in Bio-medical Engineering.	1	CO5

Scheme Name: SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASES111	ESC	Engineering Mechanics	2	-	2	2	6	2	-	1	3

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Code	Course Description		Examination Scheme					
			Continuous Assessment Tests (CAT)					
ASES111	Engineering Mechanics	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			20	20	10	50	100	1

Course Objectives:

1. To study and analyze the motion of moving particles / bodies
2. To study and analyze the forces on static bodies.
3. To familiarize the concept of equilibrium, centroid and friction.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASES111.1	Understand the concepts of force, moment and resultant of the system of coplanar force.	L2
ASES111.2	Analyze the basic principles of centroid and moment of inertia of plane lamina	L4
ASES111.3	Illustrate the concept of equilibrium in two and three dimension systems with the help of FBD.	L3

ASES111.4	Understand the basic concept of friction and apply it in real-life problems.	L3
ASES111.5	Calculate the parameters required to quantify the Kinematics of Particles and Rigid bodies.	L3
ASES111.6	Analyze the parameters required to quantify the Kinetics of rigid bodies.	L4

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
0	Prerequisite	Resolution of a force. Use of trigonometry functions. Parallelogram law of forces. Law of triangle. Polygon law of forces, Lami's theorem. Concepts of Vector Algebra. Uniformly accelerated motion along a straight line, Law of conservation of Energy, Law of conservation of Momentum (Note: There will be no questions from the prerequisite in the theory examination)	**01**	**CO1**
I	**System of Forces**	Classification of force systems, Principle of transmissibility, composition and resolution of forces. Resultant of coplanar force system (Concurrent forces, parallel forces and general system of forces). Moment of force about a point, Couples, Varignon's Theorem.	**04**	**CO1**
II	**Centroid and Moment Of Inertia**	**2.1 Centroid**: Centroids of plane laminas: Plane lamina consisting of primitive geometrical shapes. **2.2 Moment Of Inertia**: Moment of inertia of plane laminas	**04**	**CO2**
III	**Equilibrium of Force system**	**3.1 Equilibrium**: Conditions of equilibrium for concurrent forces, parallel forces and general forces, Couples. Equilibrium of rigid bodies, free body diagrams. **3.2 Equilibrium of Beams:** Types of beams, simple and compound beams, type of supports and reaction: Determination of reactions at supports for various types of loads on beams. (Excluding problems on internal hinges)	**05**	**CO3**
IV	**Friction**	Laws of friction. Cone of friction. angle of repose, angle of friction, equilibrium of bodies on a horizontal and inclined plane. Problems on block and ladder	**02**	**CO4**

V	**Kinematics of particle and rigid bodies**	**4.1** Motion of particles with variable acceleration. Motion along a plane curved path. velocity and acceleration in terms of rectangular components, tangential and normal components of acceleration. Problems on Motion curves x-t,v-t, a-t diagram and Projectile motion 4.2 Introduction to general plane motion, problem based on Instantaneous center (ICR) method for general plane motion. Problems on slider crank mechanism	**04**	**CO5**
VI	**Kinetics of particle**	**5.1** Force and Acceleration: -Introduction to basic concepts, D'Alembert's Principle, concept of Inertia force, Equations of dynamic equilibrium. **5.2** Principle of linear impulse and momentum. Impact and collision: Law of conservation of momentum, Coefficient of Restitution. Direct Central Impact and Oblique Central Impact. Loss of Kinetic Energy in collision of inelastic bodies. **5.3** Work Energy principle for a particle in motion Application of work energy principle to a system consist of connected masses and springs	**06**	**CO6**
Total			**26**	

Text Books:

1. Engineering Mechanics by A K Tayal, Umesh Publication.
2. Engineering Mechanics by Kumar, Tata McGraw Hill
3. Engineering Mechanics by Beer &Johnston, Tata McGraw Hill

References:

1. Engineering Mechanics by R. C. Hibbeler.
2. Engineering Mechanics by F. L. Singer, Harper & Raw Publication
3. Engineering Mechanics by Macklin & Nelson, Tata McGraw Hill
4. Engineering Mechanics by Schaum Series
5. Engineering Mechanics (Statics) by Meriam and Kraige, Wiley Books
6. Engineering Mechanics (Dynamics) by Meriam and Kraige, Wiley Books
7. Introduction to Industrial Robotics by Ramchandran Nagrajan, Pearson publication

Online References:

1. https://archive.nptel.ac.in/courses/112/106/112106286/
2. https://onlinecourses.nptel.ac.in/noc21_me70/preview
3. https://archive.nptel.ac.in/courses/112/106/112106180/

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test

- Assignment
- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** need to be answered

List of Experiments:

Sr No	List of Experiments	Hrs.	CO mapping
01	Determination of resultant of coplanar concurrent force system	**02**	**CO1**
02	Determination of centroid of different plane lamina	**02**	**CO2**
03	Determination of support reactions of a Simply Supported Beam.	**02**	**CO3**
04	Determination of coefficient of friction using inclined plane	**02**	**CO4**
05	Kinematics of particles. (Uniform motion of a particle, Projectile motion, motion under gravity)	**02**	**CO5**
06	Kinetics of particles. (Collision of bodies)	**02**	**CO6**
07	Verification of the Principle of Moments (Bell crank lever)	**02**	**CO2**
08	Verification of the equations of equilibrium for non-concurrent non-parallel (General)force system.	**02**	**CO3**
09	Collision of elastic bodies (Law of conservation of momentum).	**02**	**CO5**

Sr No	List of Assignments / Tutorials	Hrs.	CO mapping
01	Resultant of Coplanar force system	**02**	**CO1**
02	Centroid of Composite plane Laminas and Moment of inertia	**01**	**CO2**
03	Equilibrium of System of Coplanar Forces including support reaction of beams	**02**	**CO3**
04	Friction of bodies on inclined plane and problems involving ladder, block and wedges	**02**	**CO4**
05	Kinematics of particles	**02**	**CO5**

06	Kinetics of particles	**02**	**CO6**

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASES112	ESC	Basic Electrical and Electronics Engineering	2	-	2	2	6	2	-	1	3

Course Code	Course Description		Examination Scheme					
			Continuous Assessment Tests (CAT)					
ASES112	Basic Electrical and Electronics Engineering	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			20	20	10	50	100	1

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Objectives:

1. To provide knowledge on fundamentals of DC circuits depending on independent sources.
2. To provide knowledge on fundamentals of DC circuits depending on dependent sources.
3. To provide knowledge of single-phase AC circuits.
4. To provide knowledge of Three phase AC circuits.
5. To provide knowledge of PN junction diode and Zener diode.
6. To provide knowledge of Transistors.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASES112.1	Apply various network theorems to determine the circuit response / behavior of independent sources.	L3
ASES112.2	Apply various network theorems to determine the circuit response / behavior of independent sources.	L3

ASES112.3	Evaluate and analyze 1-Φ AC circuits.	L4
ASES112.4	Evaluate and analyze 3-Φ AC circuits.	L4
ASES112.5	Study the construction, operation and applications of PN junction diode and Zener diode.	L3
ASES112.6	Study construction, operation and applications of some Transistors.	L3

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5:Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hours	CO Mapping
0	Prerequisite	Resistance, inductance, capacitance, series and parallel connections of resistance, concepts of voltage, current, power and energy and its units. Magnetic circuits, MMF, Magnetic field strength, reluctance.	**1**	
I	01	**DC Circuits: (Only independent sources)** Kirchhoff's Laws, Ideal and Practical Voltage and Current Sources, Independent Sources, Source Transformation, Mesh and Nodal Analysis (no super node and super mesh) Star-Delta / Delta-Star Transformations, Superposition Theorem, Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer Theorem.	**06**	**CO1**
II	02	**DC Circuits: (Only Dependent sources) Dependent Sources,** Mesh and Nodal Analysis (no super node and super mesh), Superposition Theorem, Thevenin's Theorem, Norton's Theorem.	**04**	**CO2**
II	03	**AC Circuits:** Generation of alternating voltage, basic definitions, average and RMS values, phasor and phase difference, sums on phasors, Single-phase ac series and parallel circuits consisting of R, L, C, RL, RC, RLC combinations, definitions - real, reactive and apparent power, admittance (Y).	**05**	**CO3**

III	04	**Three- Phase Circuits:** Generation of Three-Phase Voltages, voltage & current relationships in Star and Delta Connections, Phasor Diagram.	**03**	**CO4**
IV	05	**Special Purpose Diodes:** (Numerical are not expected) Characteristics and operation of Zener Diode and application as a voltage regulator. Basic and structure of LED. Application of LED in indicative and lighting displays.Diode and Special Purpose Diodes: (Numerical are not expected)	**03**	**CO5**
VI	06	**Introduction to Transistor :** Structure and operation of BJT. BJT configurations (only common emitter). FET structure and operation. Application of BJT and FET in amplification and switching.	**04**	**CO6**
		Total Hours	**26**	

Text Books:

1. V.N.Mittaland Arvind Mittal "Basic Electrical Engineering" Tata Mc Graw Hill,(Revised Edition)
2. Vincent Del Toro "Electrical Engineering Fundamentals", PHI Second edition, 2011
3. Edward Hughes "Hughes Electrical and Electronic Technology", Pearson Education(Tenth edition)
4. D P Kothari and I J Nagrath "Theory and Problems of Basic Electrical Engineering", PHI 13th Edition 2011.
5. M.Naidu, S.Kamakshaiah "Introduction to Electrical Engineering" Mc Graw-Hill Education, 2004.
6. B.R Patil "Basic Electrical Engineering" Oxford Higher Education,
7. Electronic Devices and Circuit Theory" by Robert L.Boylestad and Louis Nashelsky

References:

1. B.L. Theraja "Electrical Engineering "Vol-I and II
2. S.N.Singh, "Basic Electrical Engineering" PHI, 2011Book
3. Electrical and Electronic Technology, 10th edition Edward Hughes, Pearson Education

Web Resources :

1. DC circuits, AC circuits, Transformer https://nptel.ac.in/courses/108108076
2. Semiconductor Devices https://www.nesoacademy.org/ec/04-analog-electronics
3. AC circuits, Semiconductor deviceshttps://onlinecourses.nptel.ac.in/noc21_ee55/preview
4. Transformer and Machines https://onlinecourses.nptel.ac.in/noc20_ee60/preview

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment

- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** needs to be answered

List of Experiments:

Sr No	List of Experiments	Hrs	CO Mapping
01	Basic safety precautions. Introduction and use of measuring instruments - voltmeter, ammeter, multi-meter, oscilloscope. Real life resistors, capacitors, and inductors.	**02**	**CO1**
02	To measure output voltage across load resistor/current through load resistor and verify the result using Mesh and Nodal analysis.	**02**	**CO1**
03	Verification of Superposition Theorem.	**02**	**CO1**
04	Verification Thevenin's and Norton's theorem.	**02**	**CO1**
05	Verification Maximum Power Transfer Theorem.	**02**	**CO1**
06	Case study on network theorem using dependent source.	**02**	**CO2**
07	To find the resistance and inductance of a coil connected in series with a pure resistance using the voltmeter method	**02**	**CO3**
08	To measure the relationship between phase and line, currents and voltages in three-phase system (star & delta)	**02**	**CO4**
09	To plot Zener diode voltage regulation characteristics.	**02**	**CO5**
10	To Study about the switching action of BJT	**02**	**CO6**

List of Assignments

Sr No	List of Assignments	Hrs	CO Mapping
01	Numerical assignment on Mesh analysis and nodal analysis	**02**	**CO1**
02	Numerical assignment on Thevenin, Norton, and maximum power transfer theorem		**CO1**
03	Numerical assignment on network theorem using dependent sources.		**CO2**
03	Numerical base on average value,RMS value of AC waveform		**CO3**
04	Numerical assignment on series and parallel circuits		**CO3**
05	Assignment on Three phase circuit		**CO4**
07	Assignment on special purpose diode		**CO5**
08	Assignment on BJT and FET		**CO6**

Online Resources:

Website Name

1. All About Circuits (https://www.allaboutcircuits.com)
2. Circuit Lab(https://www.circuitlab.com)
3. Tinker cad(https://www.tinkercad.com)

Assessment:

Practical& Oral Exam: An Oral & Practical exam will be held based on the above syllabus.

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme(Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASES113	ESC	Digital System	2	-	2	2	6	2	-	1	3

E- Experiments **M-** Mini Project **P-** Presentation **CS-** Case Study **A-** Attendance

Course Code	Course Description		Examination Scheme					
			Continuous Assessment Tests (CAT)					
ASES113	Digital System	Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			20	20	10	50	100	1

Course Objectives:

- To study the fundamentals of digital system. To equip students with the foundational knowledge of computer organization and architecture, fostering an understanding of how hardware and software components collaborate to execute tasks, and preparing them to design and optimize computing systems for real-world applications.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASES113.1	Apply Fundamentals of digital logic system	**L3**
ASES113.2	Apply algorithms to solve Arithmetic and logic operation	**L3**
ASES113.3	Understand the basic concept of digital components	**L2**
ASES113.4	Analyze different types of memories	**L4**
ASES113.5	Understand basic of I/O organization	**L2**
ASES113.6	Comprehend processor organization with various control signal	**L2**

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
I	**Computer Fundamentals**	**Number Systems and Conversion:** Binary. Octal and Hexadecimals. **Binary Number representation:** Sign Magnitude, 1's and 2's Compliment representation. **Logic Gates:** AND, OR, NOT, NAND, NOR, EX-OR, EX- NOR **Codes: BCD**, Excess 3, ASCII **Model: Von** Neumann model and Harvard	**4**	**CO1**
II	**Arithmetic and Logical operation**	**Operation:** Addition and Subtraction on Binary, Octal, Hexadecimal number **Algorithm**: Booth's Algorithms for multiplication and division (Restoring and Non restoring algorithm)	**4**	**CO2**
III	**Digital Components**	**Adder**: Half Adder,Full Adder Decoder, Priority Encoder :Decimal to binary encoder and Octal to binary encoder **Flip and Flop** (SR,JK, Master and slave flip flop,T and D)	**4**	**CO3**

IV	**Memory Systems Organization**	Introduction to Memory and Memory parameters. **Classifications:** primary and secondary memories. Types of RAM and ROM PROM,EPROM **Operation and characteristics** :SSD,Flash memory **Cache memory:** Concept, hierarchy (L1, L2, L3),Cache Coherency and technique to resolve	**4**	**CO4**
V	**I/O Organization**	**Buses:** Types of Buses, Bus Arbitration, Bus standards and its comparative study **Types of data transfer techniques:** DMA, pipeline hazardous.	**4**	**CO5**
VI	**Processor Organization and Control Unit Design**	**8086 Processor**: Architecture of 8086 processor, Instruction formats, Addressing modes. segmentation, Pipelining **Control Unit:** Instruction interpretation and sequencing, **RISC and CISC:** Introduction to RISC and CISC , design issues.	**6**	**CO6**
Total			**26**	

Text Books:

1. Modern Digital Electronics by R.P Jain, McGraw-Hill India.
2. Computer Organization and Embedded Systems by Carl Hamacher , Zvonko Vranesic and Safwat Zaky , McGraw-Hill India
3. Computer Architecture and Organization by John P. Hayes , Tata McGraw-Hill.
4. Computer Organization and Architecture:Designing for Performance by William Stallings, Pearson.
5. Microprocessor and Interfacing: Programming & Hardware by Douglas V Hall , Tata-McGraw Hill.
6. Microprocessor based design by Michael Slater , Pearson/PHI.

References:

1. Structured Computer by Andrew S. Tanenbaum
2. Microcomputer System The 8086/8088 family Organization by Liu and Gibson.
3. Computer Architecture and Organization: Design Principles and Applications by B. Govindarajulu.
4. Advance Computer Architecture: Parallelism, Scalability, Programmability by Kai Hwang
5. Programmer's reference Manual for IBM Personal Computers by Steven Armburst.

Online References:

1. https://www.classcentral.com/course/swayam-computer-organization-and-architecture- a-pedagogical-aspect-9824
2. https://nptel.ac.in/courses/106/103/106103068/
3. https://www.coursera.org/learn/comparch
4. https://www.edx.org/learn/computer-architecture
5. **https://cse.iitkgp.ac.in/~chitta/coldvl/**

NPTL links

1	https://nptel.ac.in/courses/117105080
2	https://archive.nptel.ac.in/courses/108/106/108106177/
3	https://nptel.ac.in/courses/108105102
4	https://archive.nptel.ac.in/courses/108/103/108103157/
5	https://nptel.ac.in/courses/108103157

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** needs to be answered

List of Experiments:

Sr No	List of Experiments	Hrs	CO mapping
01	Verification and interpretation of Implementation of truth table using AND,OR,NAND,NOT,NOR,EX-OR,EXNOR logic gates using bread board.	**02**	**CO1**
02	Implementation of number conversion (HEX to BCD, ASCII to BCD, BCD to ASCII) using MASM.,Kit,virtual lab	**02**	**CO2**
03	Implement Booth's Multiplication Algorithm. Use COA virtual lab by IIT Kharagpur.	**02**	**CO2**
04	Implement Division Algorithm (Non-Restoring and/or Restoring) Use COA virtual lab by IIT Kharagpur.	**02**	**CO2**

05	To Study Half adder and full adder using kit	**02**	**CO3**
06	To study Flip Flop use virtual lab or kit	**02**	**CO3**
07	Designing of memory using COA virtual lab by IIT Kharagpur.	**02**	**CO4**
08	To transfer the block of data using string instruction.using assembly language.	**02**	**CO5**
09	Installation and Configure DOS, MASM, Debugg and 8086 Emulator.	**02**	**CO6**
10	To perform the 8-bit arithmetic operation using assembly language.	**02**	**CO6**
11	To perform the addition of 16-bit using assembly language.	**02**	**CO6**
12	To perform the subtraction of 8-bit using assembly language.	**02**	**CO6**
13	To perform the subtraction of 16-bit using assembly language.	**02**	**CO6**
14	To perform 8-bit multiplication .using assembly language.	**02**	**CO6**
15	To perform the division of 8-bit using assembly language.	**02**	**CO6**

Sr No	List of (Presentation/ Case Study)
01	Number system application
02	Gates application
03	Digital devices application
04	Flip flop application
05	Processor application
06	Digital Clock Design
07	Traffic Light Controller
08	Pentium and above processors.

Oral Exam: An Oral exam will be held based on the entire syllabus.

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme(Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASAE111	AEC	Professional Communication and Ethics	-	-	2*+2	-	4	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT %	AS/CS/Q%	A %	ESE	Total	Credits
ASAE111	Professional Communication and Ethics	30	30	20	20	100	2

ACT-Activity **AS-** Assignment **CS-** Case Study **A-** Attendance

Course Objectives: The learners should be able to:

1. Communicate effectively by analysing communication barriers in order to avoid hesitation in personal and professional arenas.
2. Critically analyse audience, environment, subject and purpose to speak proficiently.
3. Competently acquire active listening skills by comprehending various types of accents through English Wordsworth Language software and thorough other activities.
4. Minutely comprehend extensive texts, technical and non-technical in order to execute relevant tasks.
5. Innovatively/critically organize and create purposeful technical writing for professional transactions by using the write choice of vocabulary.
6. Successfully manage teams, by applying ethical standards to deliver synergistic solutions.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASAE111.1	Use communication effectively by analysing communication barriers in order to avoid hesitation in personal and professional arenas.	L2
ASAE111.2	Analyze critically the audience, environment, subject and purpose to speak proficiently.	L4
ASAE111.3	Appreciate other's point of view and comprehend various types of accents through English Wordsworth Language software and thorough other activities	L3
ASAE111.4	Comprehend extensive technical and non-technical texts to execute specific tasks	L3
ASAE111.5	Plan and create purposeful technical writing for professional transactions by using the write choice of vocabulary.	L6
ASAE111.6	Employ ethical standards and managerial skills in various professional situation	L4

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5:Evaluate	L6: Create

Module	Detailed Content	Hrs	COS
01	**Fundamentals of Communication:** 1.1 Introduction to Theory of Communication: a) Definition; b) Objectives and; c) The Process of Communication 1.2 Methods of Communication: i) Verbal (Written & Oral) and ii) Non-verbal a. Non-verbal cues perceived through the five senses: (Visual, Auditory, Tactile, Olfactory and Gustatory cues) b. Non-verbal cues transmitted using: (Body, Voice, Space, Time and Silence) 1.3 Barriers to Communication: a) Mechanical/External; b) Physical/Internal; c) Semantic & Linguistic d) Psychological; and; e) Socio-Cultural. 1.4 Organizational Communication: a) Formal (upward, downward, horizontal) and b) Informal Communication(grapevine).	**6**	**CO1**

02	**Developing Basic Listening and Reading Skills** 2.1 a) Definition, meaning, importance and barriers to overcome b) Differentiate between Listening and Hearing c) Seven elements of effective listening skills. 2.2 Reading Comprehension: SQ5R- reading strategy, Long Passages and Short Passages, Summarization of reading passages, reports, chapters, books; Radial Diagrams like Mind Maps (Flow Charts, Tree Diagrams, Cyclic Diagrams, Linear Diagrams like Timelines, Pyramids, Venn Diagrams, and Point-form Summaries One-sentence Summaries of Central Idea)	**5**	**CO2**
03	**Verbal Aptitude for Employment** 3.1 Vocabulary Building: a) Meaning of Words in Context; b) Synonyms & Antonyms; c) Avoiding redundancy; d) Euphemism; e) Prefixes & Suffixes and; f) Standard Abbreviations and Acronyms Grammar: a) Identifying Common Errors; b) Subject - Verb Agreement; c) Article and; d) Preposition	**4**	**CO3**
	3.2 Vocabulary Building: a) Meaning of Words in Context; b) Synonyms & Antonyms; c) Avoiding redundancy; d) Euphemism; e) Prefixes & Suffixes and; f) Standard Abbreviations and Acronyms 3.3 Grammar: a) Identifying Common Errors; b) Subject - Verb Agreement; c) Article and; d) Preposition		
4	**Business Correspondence/ Writing Skills** 4.1. Seven Cs of Business Correspondence: 1) Completeness; 2) Conciseness; 3) Consideration; 4) Concreteness; 5) Clarity; 6) Courtesy and; 7) Correctness 4.2. Parts of a Formal Letter and Formats: (Complete Block Style) 1) Parts/Elements of a Formal Letter: Letterheads and/or Sender's Address, Dateline, Reference Number, Inside Address, Attention Line (Optional), Salutation, Subject Line / Caption Line / Reference Line, Body of the Letter, Complimentary Close, Signature Block, Identification Marks, Enclosures/Attachments, Carbon Copy Notation (courtesy copy), 4.3. Emails: 1) Format of Emails; 2) Features of Effective Emails and; 3) Language and style of emails 4.4. Types of Letters in Both Formal Letter Format and Emails - 1) Enquiry letter (internship, placement, workshop) 2) Request/Permission and Sales letter 3) Application Letter (Leave letter, apology letter, seeking permission for facilities)	**4**	**CO 4**
05	**Basic Technical Writing** 5.1. Introduction 1) What is Technical Writing? 2) Importance and Principles of Technical Writing 3)Difference between Technical Writing & Literary Writing 4)Framing Definitions 5.2. Writing User Instructions: 1) User Instructions; 2) Hazard Notations /Special Instructions- (Note, Precaution Warning, Caution and Danger)	3	**CO-5**

06	**Personality Development and Social Etiquettes** 6.1. Personality Development: a) Introducing Self and/or a Classmate; and b) Formal Dress Code 6.2. Social Etiquettes: a) Formal Dining Etiquettes; b) Cubicle Etiquettes; c) Responsibility in Using social media; d) Showing Empathy and Respect; Learning Accountability and Accepting Criticism 6.3. Leadership Skills 6.4. Team Management, Time management and Decision Making	**4**	**CO-6**

Text Books:

1. Sanjay Kumar & Pushp Lata (2018). Communication Skills with CD. New Delhi: Oxford University Press.
2. Hemphill, P.D., McCormick, D. W., & Hemphill, R. D. (2001). Business Communication with writing improvement exercises. Upper Saddle River, NJ: Prentice Hall.
3. Locker, Kitty O. Kaczmarek, Stephen Kyo. (2019). Business Communication: Building Critical Skills. Place of publication not identified: Mcgraw-hill.
4. Murphy, H. (1999). Effective Business Communication. Place of publication not identified: McGraw-Hill.
5. Raman, M., & Sharma, S. (2016). Technical Communication: Principles and practice. New Delhi: Oxford University Press.

Reference Books:

1. Soft Skills, Dr. K. Alex, S. Chand Publication, 2009
2. English Grammar and Composition, S.C. Gupta, Arihant Publication, 2014 Oxford handbook of Commercial Correspondence, A. Ashley, Raman, M., & Sharma, S. (2016). 3. Technical Communication: Principles and practice. New Delhi: Oxford University Press Lewis, N. (2014). Word power made it easy. Random House USA.

Module	List of Activities	Hrs.	COS
01	**Speaking Skills:** - Self-Introduction - Extempore - Scaffolded story telling	4	CO1
02	**Listening Skills: (Through EWL Software)** - Active Listening - Grammar - Pronunciation - Speeches (Political and Social Issues) - Songs - Current Affairs	5	CO3
03	**Writing Skills** - Applications/ Emails/ Letters - Script Writing/ Blogs/Content Creation - Technical Description (Computer, Mobile phone, etc.)	4	CO4

04	**Reading Skills** - Comprehensions (Short and Long) - Vocabulary Building Activities - Summarization - Paraphrasing	4	CO3
05	**Presentation Skills** -Role Plays -Debate -Group Discussion -Interview	5	CO5
06	**Personal Etiquette and Ethics** - Grooming Techniques - Case Study - Presentation	4	CO6

JNIESTRT

Smt. Indira Gandhi College of Engineering

Estd. : 1993-94

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme(Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASAE112	AEC	Computer Workshop	-	-	2*+2	-	2	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASAE112	Computer Workshop	40	--	10	50	100	2

Course Objectives:

1. To introduce students to the physical components of a computer system and their functions.
2. To provide hands-on experience in assembling and disassembling a desktop PC.
3. To develop skills in basic networking setup, including cable crimping and LAN configuration.
4. To familiarize students with installing operating systems like Windows and Linux.
5. To guide students in installing essential drivers and software tools.
6. To equip students with basic troubleshooting and system maintenance techniques.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASAE111.1	Identify and understand the basic components of a **computer** system.	L2
ASAE111.2	Assemble and disassemble a desktop computer.	L3
ASAE111.3	Perform crimping and basic LAN cable setup.	L3

ASAE111.4	Install Windows and Linux operating systems.	L3
ASAE111.5	Install essential drivers and utility software.	L3
ASAE111.6	Perform basic system troubleshooting	L3

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5:Evaluate**	**L6: Create**

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
I	**Module 1: Introduction to Computer Hardware**	Overview of Input/Output devices, Identification of computer components: motherboard, RAM, processor, SMPS, hard disk, etc. Different types of ports and connectors (USB, HDMI, VGA, LAN, Audio, SATA, etc.)	**03**	CO1
II	**Module 2: Assembling and Disassembling of PC**	Precautions before assembling, Step-by-step demonstration and practice of assembling a desktop. BIOS setup and checking POST (Power-On Self-Test), Disassembling procedure	**04**	CO2
III	**Module 3: Crimping and Network Setup**	Introduction to networking basics, Types of cables: Straight-through and Crossover, Demonstration of RJ-45 crimping using crimping tool, Testing LAN cable using a cable tester, connecting multiple PCs using a switch or router	06	CO3
IV	**Module 4: Operating System Installation**	Introduction to various OS (Windows, Linux), Creating bootable USB using Rufus or similar tools, BIOS/UEFI settings for booting from USB, Partitioning and formatting hard drives, Installation of Windows 10/11 and Ubuntu, Post-installation tasks	**06**	CO4
V	**Module 5: Driver & Software Installation**	Installation of motherboard drivers, LAN, audio, and graphics drivers, installing antivirus, productivity software (MS Office/Libre Office), browser, PDF reader, Customizing desktop setting	**03**	CO5

VI	**Module 6: Troubleshooting and Maintenance**	Common problems and solutions (no display, boot failure, loose connections), System performance tuning basics, Disk cleanup, defragmentation, checking for updates, Safe shutdown and power backup awareness (UPS)	**04**	CO6
Total			**26**	

Text Books:

1. Computer Fundamentals" by P. K. Sinha
2. Vikas Gupta, "Hardware and Networking Guide", Dreamtech Press.

References:

1. Balvir Singh, "Computer Hardware and Maintenance", Firewall Media.

Online References:

1. Videos from trusted educational platforms like NPTEL, YouTube
2. Online tutorials and OEM user manuals (Intel, AMD, Microsoft, Ubuntu)
3. https://www.youtube.com/watch?v=N1dcCzfgdhs
4. https://www.youtube.com/watch?v=4XTtgWM4yeU
5. https://www.youtube.com/watch?v=9hpPczmnDUE
6. https://nptel.ac.in/courses/106105214

List of Experiments:

Sr No	List of Experiments	Hrs	CO mapping
01	Identify and describe internal and external computer hardware components.	2	CO1
02	Identify and connect various input/output devices and ports.	2	CO1
03	Assemble a desktop PC from scratch and check functionality.	2	CO2
04	Disassemble a desktop PC and safely pack components.	2	CO2
05	Configure BIOS settings and understand POST.	2	CO2
06	Create a bootable USB drive using a utility like Rufus.	2	CO2
07	Perform RJ-45 crimping and test LAN cable.	2	CO3
8	Setup a basic LAN using a switch/router.	2	CO3
9	Install Windows 10/11 operating system.	2	CO4

10	Install Ubuntu Linux operating system.	2	CO4
11	Install essential drivers (chipset, audio, LAN, graphics).	2	CO5
12	Install and configure basic software (MS Office/LibreOffice, antivirus, browser).	2	CO5
13	Perform disk cleanup and system maintenance tasks.	2	CO6
14	Identify and troubleshoot basic hardware and software problems.	2	CO6

JNIESTRT

Smt. Indira Gandhi College of Engineering

Estd. : 1993-94

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme(Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASAE112	AEC	Mechanical Workshop	-	-	2*+2	-	2	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASAE112	Mechanical Workshop	40	--	10	50	100	2

Course Objectives:

1. To impart training to help the students develop engineering skill sets.
2. To inculcate respect for physical work and hard labor.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASAE112.1	Perform basic fitting operations using appropriate hand tools to produce mechanical joints with accuracy and safety.	L3
ASAE112.2	Create carpentry joints by using wood working tools, demonstrating measurements, cutting, and assembling skills.	L6
ASAE112.3	Execute fundamental welding operations and understand the differences between welding techniques and safety practices.	L3

ASAE112.4	Fabricate simple sheet metal components and perform brazing joints, interpreting development of surfaces and joining methods.	L6
ASAE112.5	Demonstrate basic forging techniques, such as drawing, bending, and upsetting, using smithy tools with proper safety precautions..	L3

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5:Evaluate**	**L6: Create**

DETAILED SYLLABUS:

Sr. No.	Detailed Content	Hrs.	CO Mapping
	Note: Trade 1 and 2 are compulsory. Select any ONE trade topics out of the topic at trade 3 to 5. Demonstrations and hands on experience to be provided during the periods allotted for the same. Report on the demonstration including suitable sketches is also to be included in the termwork		
Trade-1	**Fitting :** • Use and setting of fitting tools for chipping, cutting, filing, marking,center punching, drilling, tapping. • Term work to include one job involving following operations : filingto size, one simple male- female joint, drilling and tapping	**10**	**CO1**
Trade-2	**Carpentry** Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood tuning and modern wood turning methods. Term work to include one carpentry job involving a joint and report on demonstration of a job involving wood turning	**09**	**CO2**
Trade-3	**Welding:** • Edge preparation for welding jobs. Arc welding for different job like, Lap welding of two plates, butt welding of plates with simple cover, arc welding to join plates at right angles.	**06**	**CO3**
Trade 4	**Sheet metal working and Brazing:** . Use of sheet metal, working hand tools, cutting , bending , spot welding	**06**	**CO4**
Trade 5	**Forging (Smithy):** 12. At least one forging job to be demonstrated and a simple job to be made for Term Work in a group of 4 students	**06**	**CO5**

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Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme(Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASAE112	AEC	Electrical Workshop	-	-	2*+2	-	2	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASAE112	Mechanical Workshop	40	--	10	50	100	2

Course objective:

1. To learn electrical safety protocols, fire prevention measures, and the proper use of electrician tools and accessories.
2. To understand the working principles of electrical measuring instruments and develop skills in accurate measurement techniques.
3. To interpret electrical diagrams, apply standard symbols, and create schematic and wiring layouts.
4. To troubleshoot and repair common electrical appliances, ensuring proper functionality and safety.
5. To use CAD software for electrical circuit design, wiring layouts, and simulations.
6. To install drivers and utility software &use Lathe machine to perform turning job

Course outcome:

CODE	COURSE OUTCOME	BLOOM LEVEL
ASAE113.1	Demonstrate electrical safety practices, proper use of fire extinguishers, and effective handling of tools and accessories	L3
ASAE113.2	Identify, operate, and interpret readings from electrical measuring instruments for accurate analysis.	L3
ASAE113.3	Interpret and analyze electrical schematics, prepare single-line diagrams for electrical systems, and apply standard symbols and conventions to develop electrical drawings.	L4
ASAE113.4	Identify faults in household electrical appliances, carry out necessary repairs, test the repaired devices for safe operation, and ensure their proper functioning.	L3
ASAE113.5	Design and simulate electrical wiring layouts using CAD software and create panel board diagrams with industry-standard accuracy	L4
ASAE113.6	Install essential drivers and utility software &Develop the necessary skill required to handle/use different operation like threading,knurling & turning operation	L4

Detailed Syllabus:

Module No.	Name of Module	Detail Contents	Hours	CO Mapping
1	**Electrical Safety, Accessories & Tools**	*Safety:* IE safety rules, fire safety, types of fire extinguishers, and personal protective equipment (PPE). *Electrical Accessories:* Switches and their Types, Lamp Holders and their Types, Ceiling Rose, Pin Plug, Socket and Adopter, Precautions for using Aluminium Cables, Difference between Insulated Wires and Cables, Measurement of Wires, Types of Wires, and Types of Cables. *Electrician Tools:* Plier Insulated, Plier Side Cutting, Screw Driver, Neon Tester, Hammer, Pincer, Chisel, Hand Drill Machine, Allen Key, Grease Gun, Out Side Micrometer, Motorised Bench Grinder, Rawl plug tool and bit, Crimping Tool, Wire stripper, Try Square, Outside and Inside Divider Calliper, Pliers flat nose, Pliers round nose, Tweezers, Spanner, Gauge, wire imperial, file set, Soldering Iron. **Suggested Lab Activities:** 1. Identify and explain the meaning of various safety signs used in electrical labs and installations. 2. Experiment on the fire extinguishers. 3. Use tools like pliers, screwdrivers, wire strippers, and crimping tools for various tasks. Identify and demonstrate the use of switches, sockets, lamp holders, plugs, and adapters.	**8**	**CO1**

2	**Use of Lab Equipments**	*Standard Lab Equipments:* Multi-meter, Power Supply, Function Generator, Tachometer, thermometer, clamp-on meter, DSO etc. **(Study all the equipments)** *Special Measuring Equipments:* True RMS multi-meter, Lux meter, Megger, LCRQ meter, Power Meter, Thermal Analyser, Anemometer, Humidity Meter, Earthing Resistance meter, Insulation Resistance meter etc. **(Study at least 3 such equipments)** *Special Lat b Equipments:* High Power DC Supply, Isolated DSO, Power Analyser, Emulators etc. **(Study at least one of such equipments)** **Lab Activities:** Students should be trained to use these classes of lab equipments with good expertise achieved. Students should clearly understand and differentiate the situations in which use of each of these equipments is best suitable.	**4**	**CO2**
3	**Electrical Drawing & Schematics**	Importance and applications of electrical drawings in installations and maintenance, Types of electrical drawings: Schematic diagrams, Wiring diagrams, Interconnection diagram, Single-line diagrams, Layout diagrams. Overview of standards and codes for electrical drawings (e.g., IS, IEC standards). Electrical Symbols and Conventions **Lab Activities:** 1. Prepare list of electrical symbols. 2. Students should study the actual electrical supply system on institute campus, prepare SLD for the network and detailed report on actual ratings of the complete system. **3.** Analyze a single-line diagram for an industrial substation.	**8**	**CO3**
4	**Repair and Maintenance of House-hold Appliances and Machines**	Testing, fault finding, Dismantling, assembling and testing after repairs of house hold appliances like standard fan and regulator, BLDC fan, heater, geyser, mixer, washing machine, microwave oven, LED lamps/tubes, Induction Cooker, Air cooler etc. **Lab Activities:** Check the fault finding and repair of electrical appliances. (Minimum three such appliances must be studied)	**4**	**CO4**
5	**AUTOCAD for electric wiring**	Schematic wiring:About wires, inserting wires, layers assignment ,triming wires,about lader and Rungs, Referencing,inserting ladeer and Runds,Revising ladder,Point to point wiring,Point to point style Drawing, Point to point wiring tools,Using point to point wiring tools Wire Numbers &leaders and source and destination signals	**4**	**CO5**

6	Driver & Software Installation (Computer) & Machine Shop(Mechanical)	• Installation of motherboard drivers, LAN, audio, and graphics drivers • Installing antivirus, productivity software (MS Office/Libre Office), browser, PDF reader Customizing desktop setting • At least one turning job is to be demonstrated and simple job to be made for Term Work in a group of 4 students.	4	CO6

	List of Experiments
1	Identify different types ofcables/wires, switches and their uses
2	Identify the different types of fuses and fuse carriers, MCB and ELCB,MCCB
3	Wiring of simple Light circuits for controlling Light/Fan point
4	Wiring of Fluorescent lamps and Light sockets
5	Wiring of power circuit for controlling power devices(16 A socket)
6	Design of Staircase Wiring/Go-down wiring/Tunnel wiring
7	Repair and maintenance of Electric Iron/Mixer Grinder /water heater/Geyser/Exhaust Fan
8	Training of Electrical Fire prevention and safety
9	Perform one experment on wiringusing AUTOCAD
10	Analyze a single-line diagram for an industrial substation.
11	Perform atleast on one turning job using Lathe machine
12	Perform disk cleanup and system maintenance tasks.
13	Identify and troubleshoot basic hardware and software problems.

Text Books:

1. J. B. Gupta, Electrical Installation Estimating & Costing, S. K. Kataria & Sons, 2009
2. Raina Bhattachraya, Electrical Design Estimating and Costing, New Age International,
3. Sham Tickoo, AutoCAD Electrical 2021: A Tutorial Approach, 2nd Edition, CADCIM Technologies
4. K B. Bhatia, Electrical Appliances and Devices, Khanna Publications
5. Basic workshop technology by Hajara Chaudhary
6. Vikas Gupta, "Hardware and Networking Guide", Dreamtech Press

Reference Books:

1. K B. Bhatia, Fundamentals of Maintenance of Electrical Equipments, Khanna Publications
2. BIS SP 30:National Electrical Code
3. Electricity Act 2003

Online Resources:

1. https://www.falstad.com/circuit/
2. https://www.autodesk.com/education/edu- software/overview?sorting=featured&p%20age=1
3. https://www.ti.com/tool/TINA-TI
4. https://www.proficad.com/
5. https://www.kicad.org/

JNIESTRT

Smt. Indira Gandhi College of Engineering

Estd. : 1993-94

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme(Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASVSC111	VSES	Programming Techniques-1: C programming	-	-	2*+2	-	4	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASVSC111	Programming Techniques-1: C programming	20	20	10	50	100	2

Course Objectives:

1. To provide exposure to problem-solving by developing an algorithm, flowchart and implementing the logic using C programming language.
2. To familiarize the basics of Conditional and Looping Control Structures in C.
3. To provide exposure about function definition, declaration and its usage and recursive functions.
4. To familiarize one and multi-dimensional arrays, structures and strings in C.
5. To provide exposure about pointers, operations on pointers and dynamic memory allocation in the C programming language.
6. To create, open, read, write, and close operations on a file.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASVSC111.1	Illustrate the basic terminology used in computer programming concept of data types, variables and operators using C.	L2
ASVSC111.2	Use control structures concepts in C programming.	L3
ASVSC111.3	Develop Functions and use it to Solve Problems in C using modern tools.	L3
ASVSC111.4	Apply arrays and strings to solve problems in C.	L3
ASVSC111.5	Demonstrate the use of structures, dynamic memory allocation and pointers in C.	L3
ASVSC111.6	Evaluate the output by using standard input output functions.	L3

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5:Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
0	**Prerequisite**	Previous knowledge of any programming concepts. Knowledge of mathematical operator.	**01**	**CO1**
I	**Introduction to C Programming.**	Basic Concepts of Problem solving, Introduction to Algorithm and Flowchart**.** Character Set, Identifiers and keywords, Data Types, Constants, Variables. **Operators**-Arithmetic, Relational and logical, Assignment, Unary, Conditional, Bitwise, Comma, other operators. Expression, statements, Library Functions, Preprocessor. Data Input and Output– getchar(), putchar(), scanf(), printf(), gets(), puts( ), Structure of C program .	**04**	**CO1**
II	**Control Structures**	**Branching**-If statement, If-else Statement, Multiway Decision. Looping –while, do-while, for Nested Control Structure-Switch Statement, continue statement, Break statement, Goto statement.	**04**	**CO2**
III	**Functions**	**Function** -Introduction of Function, Function Main, Defining Function, accessing a Function, Function	**04**	**CO3**

		Prototype, Passing Arguments to a Function, Recursion. Storage Classes –Auto, Extern, Static, Register		
IV	**Arrays and Strings**	**Single and Multidimensional Arrays**: Array Declaration and Initialization of arrays – Arrays as function arguments. Strings: Initialization and String handling functions.	**04**	**CO4**
V	**Structures and Pointers**	**Structure-** Declaration, Initialization, structure within structure, Operation on structures, Array of Structure. **Union :**Declaration, Initialization,Difference between Structure and union. **Pointer:** Introduction, Definition and uses of Pointers, Address Operator, Pointer Variables, Pointer Arithmetic, Pointers to Pointers, Pointers and Array, Passing Arrays to Function, Pointers and Function, Pointers and two-dimensional Array, Array of Pointers, Dynamic Memory Allocation.	**05**	**CO5**
VI	**File Handling**	Introduction to streams. Types of files. Operations on text files. Standard library input/output functions. Random access to files	**04**	**CO6**
Total			**26**	

Text Books:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Programming with C	Fourth	Byron Gottfried	McGraw Hill (Schaum's outline series)	2018
2	Foundations of Programming Languages	Second	Kent D. Lee	Springer	2017
3	How to Solve it by Computer	First	R.G. Dromey	Prentice Hall India	1998
4	The C programming Language	Second	Kernighan, Ritchie	Pearson	2015

References:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Let Us C	Sixteenth	Yashwant Kanetkar	BPB	2017
2	Programming Language Concepts	Third	Carlo Ghezi, Mehdi Jazayeri	John Wiley and Sons	2008
3	Computer Programming in C	Second	V.Rajaraman and Neeharika Adabala	PHI Learning	2014

Online References:

1. NPTELCourse: Introduction to Programming in C by Prof. Satyadev Nandakumar, Department of Computer Science and Engineering, IIT Kanpur
2. Weblink-https://archive.nptel.ac.in/courses/106/104/106104128/
3. Problem Solving through Programming in C B Prof. Anupam Basu, Department Of ComputerScience and Engineering, IIT Kharagpur
4. Weblink-https://archive.nptel.ac.in/courses/106/105/106105171/

List of Experiments:

Sr. No.	Name of the Experiment	CO
1	C Program to convert Centigrade to Fahrenheit	CO1
2	C Program to generate Pascal's triangle, Floyd's triangle	CO1
3	C Program to compare two numbers and determine whether they are odd or even.	CO2
4	C Program to find percentage marks of four subjects. Then determine whether the student has secured distinction, first class, second class or fail. Percentage >=75 Distinction, Percentage >=60 First Class, Percentage>=40 second class etc.	CO2
5	C Program to print numbers between 1 and 100 which are multiples of 5 by using do while loop.	CO2
6	C Program to create four types of user defined function for addition () of two numbers	CO3
7	C Program to find Fibonacci series for given no of elements using recursive function.	CO3
8	C Program to sort elements in ascending or descending array.	CO4
9	C Program to check if string palindrome or not	CO4
10	C Program to create a structure to enter details for 5 students. The Details Rename, branch, roll no and marks of five different subjects. Also calculate the total marks and arrange them in ascending order.	CO5
11	C Program to create, initialize, assign and access a pointer variable	CO5
12	C Program to Swap two numbers using call by value and call by reference functions.	CO5
13	C Program to list all files and files and subdirectories in the directory.	CO6
14	C Program to copy contents of one file to another file	CO6
15	C Program to merge contents of two files into a third file	CO6

Note: Any 10 Experiments which covers all COs and important topics can be selected for performance.

END-SEMESTER ASSESSMENT

1. Term Work

Students Will Be Given Minimum 10 tasks. Students are expected to

1. Identify Variables, data types methods/approach required to write the code for the given task and apply the same.
2. Gain knowledge Operators, data input and output concept
3. Recall basic control structures, understand conditional structures and apply to solve problems in C.
4. Execute Given task for different inputs and verify the result
5. Execute the function and integrate the function for task completion.
6. Create a1D, 2d Array to Solve Problems.
7. Apply Structure Concept to Solve the problem.
8. Apply the concept of pointers to solve the problem.

Students will be evaluated based on following:

1. Regularity And active participation
2. Journal Write-up
3. Logic building for the given task
4. Rectifying logical errors and syntax errors
5. Well-structured and organized program
6. Verification of Experiment Output for different inputs

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme(Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASVE111	VEC	Universal Human Values	-	-	2*+2	-	4	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASVE111	Universal Human Values	30	30	20	20	100	2

ACT-Activity **AS-** Assignment **CS-** Case Study **A-** Attendance

Course Objectives:

1- To help students understand the need, basic guidelines, content, and process for value education.
2- To facilitate the development of a holistic perspective based on self-exploration about happiness and prosperity.
3- To develop a commitment towards human values and ethical human conduct.
4- To sensitize students towards sustainable practices and responsible living.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASVE111.1	Understand the importance of self-exploration as a process for discovering human values.	L2
ASVE111.2	Develop clarity about the concepts of happiness and prosperity in the light of right understanding.	L2
ASVE111.3	Apply the principles of universal human values in real-life situations.	L3
ASVE111.4	To motivate students to apply these values in personal, professional, and social life.	L3
ASVE111.5	Demonstrate ethical responsibility and environmentally sound behavior.	L6
ASVE111.6	Develop a holistic and humane perspective on professional ethics and social responsibility.	L4

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5:Evaluate	L6: Create

DETAILED SYLLABUS:

S.No	Module	Detailed Content	Activities	Hrs.	CO
I	**Introduction**	● Why UHV? Purpose and motivation for the course ● Getting to know each other ● Self-exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration ● Continuous Happiness and Prosperity the basic Human Aspirations ● Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority ● Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario ● Method to fulfil the above human	Vipassana	**4**	**CO1**

		aspirations: understanding and living in harmony at various levels.			
II	**Aspirations and Concerns**	● Understanding human being as a co-existence of the sentient 'I' and the material 'Body' ● Basic human aspirations ● Need for a holistic perspective and Role of UHV ● Understanding the needs of Self ('I') and 'Body' - happiness and physical facility ● Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) ● Understanding the characteristics and activities of 'I' and harmony 'I'.	Yoga	**5**	**CO2**
III	**Self-Management**	● Self-confidence, peer pressure, time management, anger, stress… ● Personality development, ● self- improvement…	Hobbies	**4**	**CO3**
IV	**Health and Society**	● Health issues, healthy diet, healthy lifestyle Hostel life ● Harmony of the Self and Body Mental and physical health ● Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail ● Programs to ensure Sanyam and Health.	Seminars/ Workshops/ Guest Lecture	**4**	**CO4**
V	**Society & Natural Environment**	● Participation in society ● Understanding the harmony in the society ● Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order from family to world family. ● Participation in nature ● Understanding the harmony in the Nature ● Interconnectedness and mutual fulfillment among the four orders of nature, cyclability and self regulation in nature	Video Blog/ Video Blog	**5**	**CO5**

VI	**Self Study**	• Reflective journaling on personal values and behavior • Reading biographies of value-centric leaders (e.g., • Mahatma Gandhi, Swami Vivekananda, Dr. A.P.J. Abdul Kalam) • Observational tasks on interpersonal relationships • Preparing posters or info graphics on harmony with nature • Creating a personal ethical code of conduct	Write Journals	**4**	**CO6**

Text Books:

1. Human values & Professional Ethics by R. R.Gaur, R Sangal, G. P.Bagaria, 2010, Excel Books , New Delhi
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. 3. Human Values, A.N. Tripathi, Published by 2004 by New Age Intl. Publishers, New Delhi 4. The Story of Stuff by Annie Leonard, published in 2010 by Free Press

References Books:

1 Small is Beautiful by E. F. Schumacher, published in 1973 by Harper & Row.
2. Slow is Beautiful by Cecile Andrews, published in 2006 by New Society Publishers
3. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
4. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
5. The Story of Stuff (Book).
6. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi 7. Small is Beautiful - E. F Schumacher.
8. Slow is Beautiful - Cecile Andrews
9. Economy of Permanence - J C Kumarappa
10. Bharat Mein Angreji Raj - PanditSunderlal
11. Rediscovering India - by Dharampal
12. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
13. India Wins Freedom - Maulana Abdul Kalam Azad
14. Vivekananda - Romain Rolland (English)
15. Gandhi - Romain Rolland (English)

Other Resources:

1. NPTEL Course: Exploring Human Values: Visions of Happiness and Perfect Society, By Prof.A.K. Sharma, Department of Humanities and Social Sciences, IIT Kanpur:-Web link https://nptel.ac.in/courses/109104068.
2. NPTEL Course: Moral Thinking: An Introduction To Values And Ethics By Prof. Vineet Sahu, IIT Kanpur:-Web link https://onlinecourses.nptel.ac.in/noc23_hs89/preview

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASHS111	HSSM	Indian knowledge System			2*+2		2	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASHS111	Indian knowledge System	30	30	20	20	100	2

ACT-Activity **AS-** Assignment **CS-** Case Study **A-** Attendance

Course Objectives: To provide practice in:

1. Understanding Traditional Indian Knowledge Systems that have evolved in India over centuries
2. Learn practical applications of traditional Indian techniques in various fields
   3. Promote the cultural heritage in Indian knowledge systems,
3. Develop skills to critically analyze Indian knowledge systems in contemporary contexts, assessing their relevance, strengths, and limitations.
4. Analyze interdisciplinary connections between Indian knowledge systems and modern scientific & technological advancements.
5. Apply communication & collaborative abilities through group discussions or presentations focusing on specific aspects of Indian knowledge systems.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASVE111.1	Learn about the evolution and practices of major Indian religions	L5
ASVE111.2	Gain insight into the cultural diversity of India through its art, literature, music, dance, and architecture.	L2
ASVE111.3	Recognize India's historical contributions to fields such as mathematics, astronomy, medicine, and technology.	L4

ASVE111.4	Develop critical ability to evaluate different interpretations of Indian knowledge systems in academics, literature, media, and popular culture.	L5
ASVE111.5	Analyze how Indian philosophical and spiritual ideas have influenced global thought	L4
ASVE111.6	Understand the relevance of Indian knowledge systems in contemporary contexts, including their role in shaping social values, ethics, and sustainable practices	L2

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5: Evaluate**	**L6: Create**

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hrs.	CO
I	**Introduction to the Indian Knowledge System (I.K.S.)**	• Basic knowledge and scope of IKS • Concept of IKS, purpose and need. • IKS in ancient India and modern India. • Bhartiya education system – ancient to modern era • Distinguish between the Gurukul system and the Modern Education System.	**3**	**CO1**
II	**Development of Scientific Thoughts in Ancient India**	• Vedas: a synopsis of the four vedas ,Sub-classification of the Vedas, Messages in vedas, Vedic Life: A Distinctive Features, Vedic Maths. • Development in Science, Technology, Astronomy, Vedic Mathematics, Life Sciences, Physiology, Ayurveda, etc. • Civilization: the Indus Valley Civilization, the Vedic Age, the Mauryan Empire, and the Gupta Empire • Dynasty: Haryanka Dynasty, Mauryan Dynasty, The Sunga dynasty, The Chola Dynasty.	**5**	**CO2**
III	**Development of Arts & Culture in India**	• Introduction to Ancient Architecture (Arts, Forts, Paintings, Sculpture, Temple architecture, etc) • Development in performing arts & culture: Music, Art of singing, Art of dancing, Natyakala Cultural traditions and Folk arts	**2**	**CO3**

IV	**Self Study** **(Good governance in ancient India)**	• Introduction to Indian religions (All religions) • Moral and Ethical Governance • Vishva Kalyan through Vasudhaiva Kutumbkam • Principles of Good Governance about Ramayana, Mahabharat, Artha Sastra and Kauțilyan State	**4**	**CO4**
V	**Contribution of Indian Scientist & Nobel Laureates**	• **Ancient Indian Science and Mathematics** • Baudhayan • Aryabhatta • Brahmgupta • Bhaskaracharya • Varahamihira • Nagarjuna • Susruta • Laureates • Kanada & Charak Rabindranath Tagore • C.V. Raman • Har Gobind Khorana • Mother Teresa • Subrahmanyan Chandrasekhar • Amartya Sen • V.S. Naipaul • Venkatraman Ramakrishnan • Kailash Satyarthi and Abhijit Banerjee	**4**	**CO5**
VI	**Sustainable** **Practices in Ancient India**	• Agriculture • Waste management • Water conservation • Forest conservation • Architecture • Urban planning • Biodiversity preservation, etc • Yoga • Pranayama and meditation for health and well- being	**5**	**CO6**
Total			**26**	

Text Books:

1. A.K Bag, History of technology in India (Set 3 vol), Indian National Science Academy, 1997.
2. An Introduction to Indian Knowledge Systems: Concepts and Applications, B Mahadevan, V R Bhat, and Nagendra Pavana R N; 2022 (Prentice Hall of India).
3. Ancient Indian Knowledge: Implications To Education System, Boski Singh; 2019
   4. India's Glorious Scientific Tradition by Suresh Soni; 2010 (Ocean Books Pvt. Ltd.)
4. Indian Art: Forms, Concerns, and Development in Historical Perspective (History of Science, Philosophy and Culture in Indian Civilization), General Editor: D.P. Chattopadhyaya, Ed. By. B.N. Goswamy; 1999 Munshiram Manoharlal Publishers Pvt. Ltd.
5. Indian Knowledge Systems: Vol I and II, Kapil Kapoor and A K Singh; 2005 (D.K. Print World Ltd).
6. Pandey, K.K. Kriya Sarira Comprehensive Human Physiology, Chaukhambha Sanskrit series, Varanasi, 2018
7. Shukla Vidyadhar & Tripathi Ravidatt, Ayurved ka Itihas evam Parichay, Chaukhambha Sanskrit Sansthan, New Delhi, 2017
8. Textbook on The Knowledge System of Bharata by Bhag Chand Chauhan; 2023 (Garuda Prakashan) 6. Pride of India- A Glimpse of India's Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati; 2006
9. Traditional Knowledge System in India, Amit Jha

Reference Books:

1. Reshmi ramdhoni, Ancient Indian Culture and Civilisation, star publication ,2018
2. Supriya Lakshmi Mishra, Culture and History of Ancient India (With Special Reference of Sudras), 2020.
3. DK Chakrabarty, Makkhan Lal, History of Ancient India (Set of 5 Volumes), Aryan book International publication, 2014

Other Resources:

1. NPTEL Course: Indian Knowledge System(IKS): Concepts and Applications in Engineering, By By Prof. B. Mahadevan, Dr. Vinayak Rajat Bhat, Dr. R Venkata Raghava, Indian Institute of Management Bangalore (IIMB), Chanakya University, Bangalore :-Web link- https://onlinecourses.swayam2.ac.in/imb23_mg53/preview

2. NPTEL Course: Indian Knowledge System (IKS): Humanities and Social Sciences, By Prof. B. Mahadevan, Dr. Vinayak Rajat Bhat, Dr. R Venkata Raghavan, Indian Institute of Management Bangalore (IIMB), Chanakya University, Bangalore:-Web link https://onlinecourses.swayam2.ac.in/imb23_mg55/preview

LIST OF ACTIVITIES:

Sr No	Details of Activities	Hrs	CO
1	**Research Based Article** - IKS in ancient India and modern India, - Bhartiya education system – ancient and modern era - Sources of Education, methods of learning– ancient and modern era - Advantages and Disadvantages of the Gurukul System, - Distinguish between the Gurukul system And the Modern Education System - Nalanda University and Takshshila University	4	CO1
2	**Case studies** Choose any art or cultural form and prepare case study. - Introduction to Ancient Architecture (Arts, Forts, Paintings, Sculpture, Temple Architecture, etc) - Development in performing arts & culture: Music, Art of singing, Art of dancing, Natyakala Cultural traditions and Folk arts.	4	CO2
3	**Visit historical places and write a report** -Prepare a report on your visit to a historical place	6	CO3
4	**Group Discussion/Debate** - Case study and answer the MCQ based on Good Governance in Ancient India (the same will be provided by teachers in the lecture).	2	CO4
5	**Quiz** (based on the module).	2	CO5
6	**Project-based activities** Prepare a project on any one of the topics given below: Sustainable Practices in Ancient India: -Agriculture - Waste management, - Water conservation, - Forest conservation, - Architecture, - Urban planning, - Biodiversity - Yoga, pranayama, and meditation for health and well-being	6	CO6

Assessment Criteria:

1. Activities
2. Assignments / Quiz / Case Studies
3. Visit Historical Places
4. Group Discussion / Presentation / Project based activity

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASBS121	BSC	Applied Mathematics-II	3	--	1	6	10	3	1	--	4

Course Code	Course Description		Examination Scheme					
ASBS121	Applied Mathematics - II		Continuous Assessment Tests (CAT)					
		Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			60	15	15	10	100	1

Course Objectives:

1. The course is aimed to develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience in using SCILAB software to handle applications to real life problems.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASBS121.1	Apply the concepts of First Order and first degree Differential equation to the problems in the field of engineering.	L3
ASBS121.2	Apply the concepts of Higher Order Linear Differential equation to solve the complex engineering problems.	L3
ASBS121.3	Apply concepts of Beta and Gamma function to solve improper integrals in engineering.	L3

ASBS121.4	Apply concepts of Double integration of different coordinate systems to solve the engineering problems.	L3
ASBS121.5	Apply concepts of Triple integration of different coordinate systems to the engineering problems.	L3
ASBS121.6	Solve numerically differential equations and integrals in the engineering problems using SCILAB software.	L3

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5: Evaluate**	**L6: Create**

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
I	**Differential Equations of First Order and First Degree**	1.1 Exact differential Equations, Equations reducible to exact form by using integrating factors. 1.2 Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation. 1.3 Simple application of differential equation of first order and first degree using L-C-R circuits. **# Self learning topics: Variable separable, Reducible to Variable Separable.**	**3** **2** **1**	**CO1**
II	**Linear Differential Equations With Constant Coefficients of Higher Order**	2.1 Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type f(D)y = X where X is e^{ax}, sin(ax + b), cos (ax +b), x^m, $e^{ax}V$ 2.2 Method of variation of parameters. 2.3 Cauchy's homogeneous linear differential equation **# Self learning topics:** Legendre's differential equation, Applications of Higher order differential equation.	**4** **2** **1**	**CO2**
III	**Beta and Gamma Function, Differentiation under Integral sign**	**Pre-requisite:** Tracing of curves 3.1 Beta and Gamma functions and its properties. 3.2 Differentiation under integral sign with constant limits of integration(one parameter only). 3.3 Rectification of curves.(Cartesian, Polar)	**3** **1** **2**	**CO3**

IV	**Multiple Integration-I**	4.1 Double integration-definition, Evaluation of Double Integrals.(Cartesian & Polar) 4.2 Change the order of integration and evaluation on a single region of integration. 4.3 Evaluation of double integrals by changing to polar coordinates **Note:** all the evaluation should have at least one standard curve)	**3** **2** **2**	**CO4**
V	**Multiple Integration-II**	**5.1** Triple integration definition and evaluation (Cartesian, cylindrical and spherical polar coordinates). **5.2** Application of double integrals to compute Area, Mass **# Self learning topics:** Application of triple integrals to compute Volume.	**4** **3**	**CO5**
VI	**Numerical solution of ordinary differential equations of first order and first degree, and Numerical Integration**	6.1 Numerical solution of ordinary differential equation using (a)Euler's method (b) Modified Euler method, (c) Runge-Kutta fourth order method (All without proof) 6.2 Numerical integration-by (a) Trapezoidal (b) Simpson's 1/3rd (c) Simpson's 3/8th rule (All without proof)	**3** **3**	**CO6**
Total			**39**	

Text Books:

1. A textbook of Applied Mathematics Vol-I & Vol-II by P. N. Wartikar & J.N. Wartikar.
2. A textbook of Engineering Mathematics by N.P. Bali & Manish Goyal. Laxmi Publication.

References:

1. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9thEd.
3. Engineering Mathematics by Srimanta Pal and Subodh, C.Bhunia, Oxford University Press
4. Elementary Linear Algebra with Application by Howard Anton and Christ Rorres. 6th edition.John Wiley & Sons, INC.
5. Numerical methods by Dr. P. Kandasamy ,S.Chand Publications

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment

- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** needs to be answered

Term Work:

A) Term Work shall consist of 6 tutorials on entire syllabus and 6 scilab tutorials based on Numerical solution of ordinary differential equation using (i) Euler Method, (ii) Modified Euler Method,(iii) Runge-Kutta Method of fourth order and Numerical integration-by (i) Trapezoidal Rule , (ii) Simpson's $1/3^{rd}$ Rule (iii) Simpson's 3/8th rule

B) Batchwise tutorials are to be conducted. The number of students per batch should be as per university pattern for practicals.

C) Students must be encouraged to write SCILAB Programs in tutorial class only.

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASES121	ESC	Engineering Graphics	1	-	2	1	4	1	-	1	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASES121	Engineering Graphics	20	20	10	50	100	2

Course Objectives:

1. To improve the visualization skill.
2. To inculcate the skill of drawing with the basic concepts.
3. To Use AutoCAD for daily working processes.
4. To teach basic utility of Computer Aided drafting (CAD) tool

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASES121.1	Understand the basic concepts of geometrical constructions to create engineering curves.	L2
ASES121.2	Apply the basic principles of projections in Projection of Points and Lines	L3
ASES121.3	Apply the basic principles of projections in Projection of Solid	L3
ASES121.4	Apply the basic principles of projections in converting pictorial views into orthographic Views.	L3
ASES121.5	Apply the basic principles of projections in converting pictorial views into sectional orthographic Views.	L3

ASES121.6	Apply the basic principles of projections in converting orthographic views into isometric view.	L3

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hours	CO Mapping
0	**Prerequisite**	1.To draw basic geometric shapes like pentagon, hexagon and square 2. Introduction to Engineering Graphics and its significance in Engineering domain 3.Types of Lines, Dimensioning Systems as per IS conventions	**01**	
I	**Engineering Curves**	Basic construction of Cycloid and Involutes	**02**	**CO1**
II	**Projection of Points and Lines**	2.1 Projections of Points Projections of points in any quadrants as well as resting on planes. 2.2 Projections of Lines Projections of lines inclined to both the reference planes (Excluding Traces of lines). Problems considering line in first quadrant only	**02**	**CO2**
III	**Projection of solid**	Projections of solids with the axis inclined to one and both reference planes. (prism, pyramid, cylinder and cone only). Triangular to hexagonal prism and pyramids to be considered. Use change of position or Auxiliary plane method.	**02**	**CO3**
IV	**Orthographic Projections**	Orthographic Projections Fundamentals of orthographic projections like concept of quadrants, observer position, horizontal, vertical and profile plane, symbol etc. Different orthographic views, First and Third angle method of projection. Views of a simple machine part as per the first angle projection method recommended by I.S..	**02**	**CO4**

V	**Sectional Orthographic Projections**	Sectional Orthographic Projections Fundamentals of sectional projections like concept of section plane, its representation, section lines and its features, need of sectional views, rib and web in section. Types of section and its representation. Different views of a simple machine part as per the first angle projection	**02**	**CO5**
VI	**Isometric Views**	Basic concept of isometric projection like why it is called isometric, what it represents, its need, isometric and non-isometric lines, isometric axes and isometric scale. Difference between isometric projection and isometric views. Conversion of orthographic views to isometric views (Excluding sphere).	**02**	**CO6**
Total			**13**	

Textbooks:

1. N.D. Bhatt, "Engineering Drawing (Plane and solid geometry)", Charotar Publishing House Pvt. Ltd.
2. N.D. Bhatt & V.M. Panchal, "Machine Drawing", Charotar Publishing House Pvt. Ltd.
3. N. H. Dubey, ‘ Engineering Drawing’

References:

1. Narayana, K.L. & P Kannaiah (2008), Textbook on Engineering Drawing, Scitech Publisher. 2. Prof. Sham Tickoo (Purdue University) & Gaurav Verma, "(CAD Soft Technologies).
3. Auto CAD 2012 (For engineers and Designers)", Dreamtech Press New Delhi.
4. Dhananjay A Jolhe, "Engineering Drawing" Tata McGraw Hill.

Online References:

https://archive.nptel.ac.in/courses/112/105/11210529
4/ https://nptel.ac.in/courses/112103019
https://archive.nptel.ac.in/courses/112/102/11210230
4/

Lab Syllabus:

Computer Graphics: Engineering Graphics Software - Orthographic Projections, Isometric Projections, Coordinate Systems, Multi-view Projection.		
Part-A	To be Taught in laboratory.	Hrs
	Overview of Computer Graphics Covering: Listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.	**3**
	Customization & CAD Drawing: Consisting of set up of the drawing page and the printer including scale settings, Setting up of units and drawing limits, ISO and ANSI standards for coordinate dimensioning.	**3**

	Annotations, layering & other Functions Covering: Applying dimensions to objects, applying annotations to drawings, Setting up and use of layers, layers to create drawings, Create, edit and use customized layers, Changing line lengths through modifying existing lines (extend/lengthen), Printing documents to paper using the print command, orthographic projection techniques, Drawing sectional views of objects (simple machine parts).	**4**
Part-B	* Activities to be completed in the CAD Laboratory. (All printouts to be part of Term Work. Preferably, Use A3 size sheets for print out.)	
	1. Auto-Cad sheet on orthographic Projections (without section)- 1 problem	**4**
	2. Auto-Cad sheet on orthographic Projection (with section)- 1 problem	**4**
	3. Orthographic Reading – 1 problem	**2**
	4.Autocad sheet on Isometric Drawing – 2 problem.	**6**

Topic for the End Semester Practical Examination (Auto CAD)

Isometric drawing. (1 problem)

Orthographic Projection (With Section) (1 problem).

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASES122	ESC	Environmental science for Engineer	2	-	-	-	2	2	-	-	2

Course Code	Course Description		Examination Scheme					
ASES122	Environmental science for Engineer		Continuous Assessment Tests (CAT)					
		Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Lab	E%	M/P/CS%	A %	ESE		
			--	--	--	--	--	--

Rationale:
Most of the Engineering branches are offspring of applied sciences and their practices have a significant impact on the environment. Understanding environmental studies is essential for engineers to develop sustainable solutions, minimize ecological footprints and promote responsible resource management. This course equips students with the knowledge of ecosystems, bi-diversity, pollution control and environmental laws, enabling them to integrate sustainability into engineering practices.

Course Objectives: The Course is aimed to:

1. To understand the importance and role of environmental studies in public awareness and health.
2. To study different natural resources, their issues and sustainable conservation.
3. To understand ecosystem types, structures and functions.
4. To explore bio-diversity, its importance, threats and conservation.
5. To learn about pollution types, causes, effects and control measures.
6. To understand environmental challenges, sustainability and ethics.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASES122.1	Explain the significance of environmental studies and the role of IT in environment and health.	**L3**
ASES122.2	Describe resource types, associated problems and conservation methods.	**L2**
ASES122.3	Classify ecosystems and explain their role in ecological balance.	**L2**
ASES122.4	Analyze bio-diversity levels and conservation strategies, especially in India.	**L4**
ASES122.5	Explain pollution impacts and suggest preventive measures.	**L3**
ASES122.6	Discuss environmental issues and propose sustainable solutions.	**L3**

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

Detailed Syllabus

Sr. No.	Name of Module	Detailed Content	Hours	CO Mapping
1	**Multidisciplinary nature of Environmental Studies**	Definition, scope and importance. Need for public awareness. Role of information technology in environment and human health. Human population and the environment. Population growth, variation among nations. Population explosion-family welfare program. Environment and human health. Women and child welfare.	**4**	**CO 1**
2	**Natural Resources**	Renewable and non-renewable resources. Natural resources and associated problems. A. Forest resources B. Water resources; Natural and associated problems. C. Mineral resources. D. Food resources. E. Energy resources; Role of an individual in conservation of natural resources. F. Equitable use of resources for sustainable lifestyles.	**4**	**CO 2**

3	**Ecosystems**	Concepts of an ecosystem. Introduction, types, characteristics features, structure and function of the following ecosystem; a. Forest ecosystem. b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) Case study on various ecosystems in India.	**4**	**CO 3**
4	**Bio-diversity and Conservation**	Introduction-definition: genetic species and ecosystem diversity. Bio-geographical classification of India. Value of bio-diversity; Consumptive use, productive use, social, ethical, aesthetic and option values, Bio-diversity at global, national, local levels in India as a mega diversity nation. Case study on bio-diversity in India.	**4**	**CO 4**
5	**Environmental Pollution Definition**	Causes, effects and control measures of: a. Air pollution b. Water Pollution c. Soil Pollution d. Solid waste Management; Causes, effect and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Case study on pollution disaster management: Floods, earthquake, cyclone and landslides. Carbon credit for pollution prevention	**5**	**CO 5**
6	**Social issues and Environment**	From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Environmental Ethics: issues and possible solution. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case study; consumerism and waste products. Environment protection act. Public awareness. Case study on Environmental ethics.	**5**	**CO 6**
Total			**26**	

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** needs to be answered

Textbooks:

1. Environmental Science: Towards a sustainable Future, G. Tyler Miller and Scott Spoolman, 13th edition, Cengage Learning 2021.
2. Environmental Management: Text and Cases, Bala Krishnamoorthy, 3rd edition, Phi Learning, Publication year 2016.
3. Green IT Concepts, Technologies and Best practices, Markus Alleman, Springer 2008.
4. Sustainable IT: Slimming down and greening up your IT Infrastucture, David F. Linthicium, IBM Press 2009.

References:

1. Environmental Biotechnology: Principles and Applications by Bruce E. Rittmann and Perry L. McCarty
2. Handbook of Environmental Engineering by Frank R. Spellman
3. Environmental Pollution and Control by P. Aarne Vesilind, J. Jeffrey Peirce, and Ruth F. Weiner

Online References:

1. **https://onlinecourses.nptel.ac.in/noc23_hs155/preview.**
2. **https://archive.nptel.ac.in/courses/127/105/127105018/.**
3. **https://www.careers360.com/courses-certifications/nptel-environmental-engineering- courses-brp-org.**

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
CEPC121	PCC	Data Structure	2	-	2	2	6	2	-	1	3

Course Code	Course Description		Examination Scheme					
CEPC121	Data Structure		Continuous Assessment Tests (CAT)					
		Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			20	20	10	50	100	1

Course Objectives:

1. To understand the purpose and significance of data structures as a computer Professional.
2. To teach concept and implementation of linear and nonlinear data structure.
3. To analyze various data structures and select the appropriate one to solve a specific real world problem
4. Explore the real time applications of various data structures.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
CEPC121.1	Apply the concepts and operations of Linear and Non-Linear data structures for solving real life problems.	L3
CEPC121.2	Implement Stack Linear data structures to solve engineering problems.	L3
CEPC121.3	Apply Queue data structures to address real-world problems.	L3
CEPC121.4	Analyze the types of Linked list to evaluate the problems in diverse applications.	L4

CEPC121.5	Analyze the Tree data structure to address real-world problems.	**L4**
CEPC121.6	Apply the concepts of Graph for solving real life problems.	**L3**

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5: Evaluate**	**L6: Create**

Detailed Syllabus:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
0	**Prerequisite**	Concepts of Functions, Recursion, Arrays, Pointers, Structures and C programming fundamentals.	**2**	
I	**Introduction**	Introduction to Data Structures, Concept of ADT, Types of Data Structures- Linear & Nonlinear, Operations on Data Structures.	**2**	**CO1**
II	**Stack**	Introduction to Stack, Stack as ADT, ADT Operations on Stack, Array Implementation of Stack, Multiple Stacks, Evaluation of Arithmetic Expressions. Real world Applications of Stacks	**4**	**CO2**
III	**Queue**	Introduction to Queue, ADT operations on Queue, Array Implementation of Queue, Types of Queues: Circular Queue, Priority Queue, Double Ended Queue and Multiple Queues, Real world Applications of Queue	**4**	**CO3**
IV	**Linked List**	Concept of Linked Lists, Linked List v/s Array, Types of Linked List- Singly linked lists, doubly linked lists and circular linked lists. Insertion, deletion, update and copying operations with Singly linked lists, doubly linked lists. Implementation of Stack and Queue using linked list. Real world Applications of Linked List	**6**	**CO4**
V	**Tree**	Introduction to Trees, Tree Terminologies, Binary Tree, Binary Tree Representation, Types of Binary Tree, Binary Tree Traversals, Binary Search Tree, Insert, Delete, Search Operations on Binary Search Tree. Real world Applications of Trees	**4**	**CO5**
VI	**Graph**	Introduction, Graph Terminologies, Representation of Graph, Graph Traversals - Depth First Search (DFS) and Breadth First Search (BFS), Real world Applications of Graph	**4**	**CO6**
Total			**26**	

Text Books:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Data Structures Using C	Latest	Aaron M Tenenbaum, Yedidyah Langsam, Moshe J Augenstein	Pearson Publication	-
2	Data Structures using C	Latest	Reema Thareja	Oxford Press	-
3	Data Structure Using C	Latest	E. Balagurusamy	Tata McGraw-Hill Education India	-
4	Data Structures: A Pseudocode Approach with C	Second	Richard F.Gilberg and Behrouz A. Forouzan	CENGAGE Learning	-

References:

Sr. No	Title	Edition	Authors	Publisher	Year
1	Fundamentals of data structures in C	Latest	Sahni Horowitz	computer scienc e press	2008
2	Introduction to Data Structure and Its Applications	Latest	Jean Paul Tremblay, P. G. Sorenson	McGraw-Hill Higher Education	-
3	Data Structures And Algorithms	5th	Narasimha Karumanchi	Career Monk	2016
4	Data Structures and Program Design in C	Latest	Robert Kruse, C. L. Tondo, Bruce Leung	Pearson Publication	-

Online References:

1. https://nptel.ac.in/courses/106/102/106102064/
2. Data Structure using C Programming – Course (swayam2.ac.in)
3. NPTELHRD Course: Data Structure & Algorithms by Dr. Naveen Garg, Department of Computer Science and Engineering, IIT Delhi
4. NPTEL Course: Programming, Data Structure & Algorithms by Department of Computer Science and Engineering, IIT Madras

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment

- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** need to be answered

List of Experiments

Sr. No.	Name of the Experiment	CO
1	Implementation of Insertion and deletion in a specific position in an Array using Function.	CO1
2	Implementation of recursive program.	CO2
3	Array Implementation of Stack.	CO2
4	Array Implementation of Linear Queue.	CO3
5	Array Implementation of Circular Queue.	CO3
6	Implement Singly Linked List.	CO3
7	Implement Doubly Linked List.	CO4
8	Implementation of Double Ended Queue using Linked List.	CO4
9	Implementation of Stack using Linked list	CO4
10	Implementation of Binary Search Tree and its traversal methods.	CO5
11	Program to count Number of leaf nodes, find the biggest and smallest and height of the tree.	CO5
12	Implementation of Reversing a List using Stack.	CO5
13	Implement Depth First Search Graph Traversal technique	CO6
14	Implement Breadth First Search Graph Traversal technique	CO6
15	Convert an Infix expression to Postfix expression using stack ADT.	
16	Program to Evaluate Postfix Expression using Stack ADT.	CO2
17	Implementation of Mini Project / Real world application	All COs

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
EEPC122	PCC	Elements of Electrical Systems	2	-	2	2	6	2	-	1	3

Course Code	Course Description		Examination Scheme					
EEPC122	Elements of Electrical Systems		Continuous Assessment Tests (CAT)					
		Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			20	20	10	50	100	1

Course Objectives:

1. To list & describe the different methods of Power generation
2. To elaborate the various types of transmission lines
3. To discuss the various types of electrical loads
4. To understand and calculate the power consumption in electrical system
5. To explain the various types of electrical energy storage system
6. To discuss the various types of electrical meters

Course Outcomes:

Code	Course Outcomes	Bloom's Level
EEPC122.1	Understand the different methods of power generations	L2
EEPC122.2	Evaluate the sending end and receiving end voltage of transmission line	L3
EEPC122.3	Study the various types of electrical loads	L2
EEPC122.4	Understand the ratings and calculate the electrical energy consumption	L2
EEPC122.5	Study the various types of electrical storage	L2

EEPC122.6	Illustrate the working of different types of meters in electrical system	L3

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
I	**Generation of Electrical Power**	Overview of different methods of Power generation: thermal (fossil fuels, nuclear), renewable (solar, wind, hydro, geothermal), nuclear and emerging technologies (tidal, wave, biomass) Layout of hydroelectric power station, thermal power plant, solar generation, nuclear power plant with their advantages and disadvantages. Cost of generation, peak load and base load plant	**06**	**CO1**
II	**Transmission**	Short, medium and long transmission lines, Types of conductors used, Single phase transmission line,3 phase transmission line (single circuit and double circuit). Application of KVL, KCL to find sending end and receiving end voltage. Calculations of Power transmitted	**04**	**CO2**
III	**Utilization of Electrical Energy**	Electric Power Distribution: Generation, Transmission and distribution systems: grid structure, voltage levels. Types of loads: Residential: lighting load, refrigeration and air conditioning, washing machine. Agricultural load: pumps. Industrial load: Electrical Drives- AC-DC, furnace, Electric heating & welding, Machines (Motors and generators: AC vs. DC)	**07**	**CO3**
IV	**Ratings & Calculation of Energy Consumption**	Power rating of household appliances such as tube light, fan, air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, understand the calculation of electricity bill for LT & HT consumers	**03**	**CO4**
V	**Energy Storage**	Battery Technologies: Chemistry basics: lead-acid, lithium-ion, sodium-ion, solid-state batteries. Charging and discharging characteristics. Battery management systems (BMS). Battery storage: types (lead-acid, lithium-ion, flow batteries), application	**03**	**CO5**

VI	**Measurement in Electrical Energy Systems**	Importance of measurement in electrical energy systems. Basic principles of electrical measurements: instruments and techniques. Moving coil and Moving iron Ammeters & Voltmeters, Power measurement by wattmeter in single phase circuit	**03**	**CO6**
Total			**26**	

Text Books:

1. Mahesh Verma, Power Plant Engineering, Metrolitan Book Co Pvt Ltd
2. RK Rajput, A Text Book of Power System engineering, Laxmi Publication
3. D. P. Kothari, I. J. Nagrath, Power System Engineering, 3 Edition, Mcgraw Hill
4. B.R. Gupta, Power System Analysis And Design, S.Chand
5. Mehta V.K., Principles of Power System, S Chand139
6. AK Sawhney, Electrical & Electronic Measurements and Instrumentation, Dhanpat Rai & Sons
7. Dincer I., and Rosen M. A. (2011); Thermal Energy Storage: Systems and Applications,Wiley

References:

1. W. D. Stevenson, Elements of Power System, 4 Edition TMH
2. Trevor M. Letcher, Storing Energy with Special Reference to Renewable Energy Source, Elsevier, 2016.
3. RS Sirohi & Radhakrisnan, Electrical Measurement & Instrumentation, New Age International

Online References: https://www.energy.gov/eere/renewable-energ

Assessment strategy (Suggestive):

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment
  - **End Semester Theory**

- **Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** needs to be answered

List of Experiments:

Sr No	List of Experiments	Hrs	CO mapping
01	Generation of sinusoidal voltage waveform using MATLAB Simulink	**02**	**CO1**
02	Case Study to compare efficiency and reliability of different renewable	**02**	**CO1**
	energy source		
03	Simulation of transmission line model using MATLAB Simulink	**02**	**CO2**
04	To deduce the transmission line performance i.e. sending end voltage and receiving end voltage for long, medium and short transmission lines using MATLAB Simulink.	**02**	**CO2**
05	Measure and plot the no load magnetization (open circuit) characteristic (V-I curve) of a DC generator	**02**	**CO3**
06	Calculate efficiency and voltage regulation of DC generator using external characteristics	**02**	**CO3**
07	Measure speed-torque characteristics of a DC motor under different load conditions.	**02**	**CO3**
08	To Study the power rating of various home appliances	**02**	**CO4**
09	To perform practical using breadboard to extract the charging and discharging characteristics of capacitor.	**02**	**CO5**
10	Measure charge-discharge characteristics of different types of batteries (e.g., lead acid, lithium-ion)	**02**	**CO5**
11	Perform voltage, current and power measurements in three phase circuit using digital meters and verify Ohm's law	**02**	**C06**
12	Perform voltage, current and power measurements in a single phase circuit using digital meters and verify Ohm's law.	**02**	**CO6**

Online References:

SR.NO.	Website Name
1.	https://www.vlab.co.in/broad-area-electrical-engineering
2.	https://www.vlab.co.in/broad-area-electronics-and-communications

List of Assignments:

Sr No	List of Assignments / Tutorials	Hrs	CO mapping
01	Assignment on Generation of Electrical Power	**02**	**CO1**
02	Assignment on Transmission Lines	**02**	**CO2**
03	Assignment on Utilization of Electrical Energy	**02**	**CO3**
04	Assignment on Ratings & Calculation of Energy Consumption	**02**	**CO4**
05	Assignment on Energy Storage	**02**	**CO5**
06	Assignment on Measurement in Electrical Energy Systems	**02**	**CO6**

Assignment: It shall consist of 6 assignments based on the above list
Oral Exam: An Oral exam will be held based on the entire syllabus.

JNIESTRT

Smt. Indira Gandhi College of Engineering

Estd. : 1993-94

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
MEPC123	PCC	Elements of Mechanical Engineering	2	-	2	2	6	2	-	1	3

Course Code	Course Description		Examination Scheme					
MEPC123	Elements of Mechanical Engineering		Continuous Assessment Tests (CAT)					
		Theory	IA-I %	IA-II %	TA%	ESE %	Total	Credit
			15	15	10	60	100	2
		Laboratory	E%	M/P/CS%	A %	ESE		
			20	20	10	50	100	1

Rationale:

Elements of Mechanical Engineering introduces fundamental concepts (thermodynamics, materials, mechanics) to build a strong foundation for solving real- world engineering problems and understanding advanced topics in subsequent semesters.

Course Objectives:

1. To familiarize with various Mechanical Engineering domains and their industrial applications.
2. To provide insights on fundamental laws and concepts in classical and modern thermal engineering.
3. To understand different types of power transmission systems with their advantages.
4. To study working and applications of household and commercial refrigeration and air conditioning systems.
5. To introduce the functioning and components of hybrid, electric, and autonomous vehicles.
6. To explore modern digital tools and simulation technologies in mechanical engineering.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
MEPC123.1	Explain the scope and societal role of Mechanical Engineering.	L3
MEPC123.2	Understand thermodynamic systems, laws, and IC engines.	L2
MEPC123.3	Describe and compare belt, chain, and gear drives.	L2
MEPC123.4	Explain the components and operation of RAC systems.	L2
MEPC123.5	Distinguish among components and systems in electric and hybrid vehicles	L3
MEPC123.6	Illustrate applications of robotics, automation, and digital twin technology.	L3

BLOOM'S Levels Targeted

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

DETAILED SYLLABUS:

No.	Module	Detailed Content	Hours	CO
0	**Prerequisite**	12th-grade physics and mathematics	**-**	**-**
I	**Introduction**	Role of Mech. Engg. in industry and society, Prime movers, energy, force, mass, pressure, work, power, **introduction to sustainable engineering**	**2**	**CO1**
II	**Thermodynamic s & IC Engines**	Laws of thermodynamics, cycles, IC engine components, stroke cycles, S.I. vs C.I. engines, **Turbocharger & Supercharger (brief)**	**6**	**CO2**
III	**Power Transmission**	Types of belts, chain, gear drives, advantages, **industrial use cases using AR/VR simulation**	**5**	**CO3**
IV	**Refrigeration & AC**	Domestic refrigeration and AC systems, **comparison between traditional and inverter-based systems**	**5**	**CO4**
V	**Automotive Systems**	EV & HEV architectures, Clutch, Gearbox, Propeller shaft, **Intro to autonomous drive assist systems**	**4**	**CO5**
VI	**Emerging Tech in Mech. Engg.**	Robotics, Automation, AR-VR, Autonomous Vehicles, **Digital Twin and AI in manufacturing**	**4**	**CO6**
Total			**26**	

Text Books:

1. Elements of Mechanical Engineering, V.K. Manglik

2. Elements of Mechanical Engineering, R.K. Rajput
3. S. Trymbaka Murthy, "Elements of Mechanical Engineering", Universities Press

References:

1. Basic and Applied Thermodynamics – P.K. Nag
2. Internal Combustion Engine – V. Ganesan
3. Electric Vehicle Technology Explained – James Larminie & John Lowry

Online References:

Sr. No.	Website Name
1.	MIT OCW: Elements of Mechanical Design
2.	NPTEL: IC Engines – IIT Madras
3.	NPTEL: Fundamentals of Thermodynamics – IIT KGP
4.	YouTube: Electric Vehicles in India

Assessment strategy (Suggestive) :

- **Internal Assessment Test (IA) for 15 % each:**

IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IA-I and the remaining 40% to 50% of the syllabus content must be covered in the IA-II.

- **Teaching assessment:**
  - Presentation
  - Quiz
  - Open Book Test
  - Assignment

- **End Semester Theory Examination:**

Question paper format

1. Question Paper will comprise a total of **six questions, each question carries one CO** which **cover the maximum contents of the syllabus.**
2. Weightage of the question will be given as per the hours allotted to respective modules
3. All **questions** need to be answered

List of Experiments:

Minimum six experiments from the following list of which a minimum one should be from dynamics.

Sr. No.	List of Experiments	Hrs	CO-mapping
01	Demonstration and identification of IC engine components (2-stroke & 4- stroke)	**02**	**CO1**
02	Simulation of gear drives (spur, bevel, worm) using software tools	**02**	**CO2**
03	Identification and virtual disassembly of RAC components and flow layout	**02**	**CO3**
04	Web-based simulation or virtual tour on Electric Vehicle architecture	**02**	**CO4**
05	CAD modelling of belt and chain drive mechanisms	**02**	**CO2**

06	Poster or presentation on Digital Twin applications in mechanical systems	**02**	**CO5**
07	Basic hands-on demo of heat engine or thermodynamic cycle using applet/simulator	**02**	**CO1**
08	Comparative study of inverter vs traditional AC systems	**02**	**CO3**

Oral Exam: An Oral exam will be held based on the entire syllabus.

JNIESTRT

Smt. Indira Gandhi College of Engineering

Estd. : 1993-94

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASVSC121	VSEC	Python Programming	-	-	2*+2	2	6	-	-	2	2

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASVSC121	Python Programming	20	20	10	50	100	2

Course Objectives:

1. To familiarize learners with Python's basic syntax, variables, data types, operators, and input/output functions.
2. To reinforce the understanding and application of conditional statements, loops, and functions in Python programming.
3. To instill learners on file handling, exception management, and Python packaging.
4. To Introduce object-oriented programming principles and their application in Python.
5. To explore advanced topics such as regular expressions, pattern matching, and GUI development.
6. To introduce and demonstrate the use of popular Python libraries for data handling.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASVSC121.1	Demonstrate the proficiency in basic python programming or Create and perform various operations on data structures like list, tuple dictionaries and strings.	L3
ASVSC121.2	Apply Control Flow and Functions for efficient coding to solve problems.	L3

ASVSC121.3	Demonstrate proficiency in handling file operations, managing exceptions, and developing Python packages and executable files for modular programming.	L3
ASVSC121.4	Illustrate the concept of Object-Oriented Programming used in python	L3
ASVSC121.5	Design Graphical User Interface (GUI) applications, utilizing appropriate Python libraries to create user-friendly interfaces.	L6
ASVSC121.6	Investigate and apply popular python libraries to conduct efficient data handling tasks.	L4

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5: Evaluate**	**L6: Create**

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hrs	CO Mapping
0	**Prerequisite**	Introduction to Programming: Understanding basic concepts like algorithms, flowcharts, and pseudocode. Problem-Solving Skills: Ability to approach problems methodically and apply logical thinking to develop solutions.	1	--
1	**Introduction to Python**	1. Introduction: Features of Python, Comparison of Python with C. 2. Basic Syntax and Data types: Identifiers, Keywords, Indention, Variables and Comments, Basic data types, Operators, Input-output. 3. Sequence data types: List, tuple, set and dictionary	**4**	**CO1**
2	**Control Flow and Functions**	1. Conditional statements: if, if...else, elif, 2. Loops in Python : while loop, for loop, nested loops) Loop manipulation using continue, pass, break. 3. Functions: Built -in functions in python , User defined functions, Parameters and return values, Scope and lifetime of variables	**4**	**CO2**
3	**File Handling and Exception Handling**	1. File handling: Opening file in different modes, closing a file, writing to a file, reading from a file 2. Dealing with Error and Scientific Debugging 3. Exceptions Handling: Errors in a Python program, exceptions, Exception handling, Types of exceptions.	**4**	**CO3**

4	**Object Oriented Programming (OOP) in Python**	1. Classes and objects: Creating a class, self variable, Methods, Constructor and destructor 2. Abstraction, Encapsulation, Polymorphism, Inheritance 3. Type of Inheritance: Single, multiple and multilevel inheritance	**4**	**CO4**
5	**Advanced Python Concepts**	1. Regular Expression, Methods of Regular Expression, Regex functions in python 2. Graphical user interface (GUI): GUI creation in python using Tkinter module, creating Canvas, Frame and Widgets.	**5**	**CO5**
6	**Python Libraries**	1. Introduction to Popular Libraries 2. NumPy for numerical computing, 3. Pandas for data manipulation 4. Matplotlib for data visualization	**4**	**CO6**
Total			**26**	

Text Books:

1. Core Python Programming, Dr. R .Nageswara Rao, Second Edition, Dream tech Press.
2. Beginning Python: Using Python2.6 andPython3.1.JamesPayne,Wrox Publication.
3. Python Programming, Anurag Gupta and G.P. Biswas, First Edition, McGraw-Hill Education.

References:

1. Learn Python the Hard Way, Zed Shaw, Third Edition, Addison-Wesley.
2. Python Projects, Laura Cassell, Alan Gauld, First Edition, Wrox Publication.
3. Introduction to computing and problem-solving using python, Balagurusamy, First Edition, McGraw Hill Education.

Online Resources:

1. Python Tutorial: http://docs.python.org/release/3.0.1/tutorial/
2. Python for everybody specialization: https://www.coursera.org/specializations/python.

List of Experiments:

The following experiments serve as samples to illustrate the application of concepts covered in each unit. Instructors are encouraged to modify and adapt these experiments to meet the specific needs of the course and the learning objectives. It is essential to ensure that the fundamental concepts and skills outlined in each unit are adequately covered, even with modifications.

Sr. No.	List of Experiments	Hrs	CO mapping
01	1. **Personalized Greeting Generator* -** Write a python code to generate Personalized Greeting. 2. **Calculating Areas of Geometric Figures* -**Write a python program to calculate areas of any geometric figures like circle, rectangle and triangle. 3. **Developing Conversion Utilities:** Develop any converter such as Rupees to dollar, temperature convertor, inch to feet etc. 4. **Calculating Gross Salary of an Employee*:** Write a Python program to calculate the gross salary of an employee. The program should prompt the user for the basic salary (BS)and then compute the dearness allowance (DA) as 70%of BS, the travel allowance (TA) as 30% of BS, and the house rent allowance (HRA) as 10% of BS. Finally, it should calculate the gross salary as the sum of BS, DA, TA, and HRA and display the result. 5. **Calculating Simple Interest:** Write a Python program to calculate the simple interest based on user input. The program should prompt the user to enter the principal amount, the rate of interest, and the time period in years. It should then compute the simple interest using the formula **Simple Interest = (Principal×Rate×Time)/100** and display the result. 6. **Exploring Basic Arithmetic Operations in Python*:** Write a Python program to explore basic arithmetic operations. The program should prompt the user to enter two numbers and then perform addition, subtraction, multiplication, division, and modulus operations on those numbers. The results of each operation should be displayed to the user.	02	**CO1**
02	1. **Task List Manager*:** Develop a Python program to manage a task list using lists and tuples, including adding, removing, updating, and sorting tasks. 2. **Student Enrollment Manager *:** Create a Python code to demonstrate the use of sets and perform set operations (union, intersection, difference) to manage student enrollments in multiple courses / appearing for multiple entrance exams like CET, JEE, NEET etc. 3. **Student Record Keeper *:** Write a Python program to create, update, and manipulate a dictionary of student records, including their grades and attendance.	02	**CO1**
03	1. **Triangle Pattern Generator Using Loops:** Write a Python program to print a triangle pattern (give any), emphasizing the transition from C to Python syntax. 2. **Number Type Identifier*:** Develop a Python program that takes a numerical input and identifies whether it is even or odd, utilizing conditional statements and loops. 3. **Character Type Identifier:** Create a Python program to check whether the given input is a digit, lowercase character, uppercase character, or a special character using an 'if- else-if' ladder. 4. **Fibonacci Sequence Generator:** Develop a Python program to print the Fibonacci sequence using a while loop. 5. **Factorial Generator*:**Design a Python program to compute the	02	**CO2**

	factorial of a giveninteger N. **6. Prime Number Analyzer*:** Using function, write a Python program to analyze the input number is prime or not. **4. Simple Calculator Using Functions*:** Implement a simple Python calculator that takes user input and performs basic arithmetic operations (addition, subtraction, multiplication, division) using functions.		
04	**1. Extracting Words from Text File***:Develop a Python program that reads a text file and prints words of specified lengths (e.g., three, four, five, etc.) found within the file. **2. Finding Closest Points in 3D Coordinates from CSV**: Write a python code to take a csv file as input with coordinates of points in three dimensions. Find out the two closest points. **3. Sorting City Names from File:** Write a python code to take a file which contains city names on each line. Alphabetically sort the city names and write it in another file. **4. Building an Executable File*:** Create a executable file for any program developed in earlier practical.	02	**CO3**
05	**1. Basic Exception Handling*:** Write a Python program that takes two numbers as input and performs division. Implement exception handling to manage division by zero and invalid input errors gracefully. **2. Custom Exceptions:** Develop a Python program that simulates a banking system with a function to withdraw money. Raise custom exceptions for scenarios such as insufficient funds and invalid account numbers **3. Logging for Debugging:** Enhance a Python program by adding logging statements to record the flow of execution and error messages. Use the logging module to configure different logging levels (INFO, DEBUG, ERROR). **4. Using a Debugger*:** Demonstrate the use of a Python debugger (e.g., pdb or an IDE with debugging capabilities) on a sample program with intentional errors. Guide students on setting breakpoints, stepping through code, and examining variable values. **5. Scientific Debugging Techniques:** Provide a Python program with multiple logic and runtime errors. Instruct students to apply scientific debugging techniques, such as binary search debugging, to identify and resolve the issues methodically.	02	**CO3**
06	**1. Event Management System:** Implement an event management system using OOP concepts to organize and manage various aspects of college festivals or events. Design classes for events, organizers, participants, and activities. Include methods for event registration, scheduling, participant management, and activity coordination. **2. Online Shopping System:** Develop classes for products, customers, and shopping carts. Include methods for adding items to the cart, calculating total costs, processing orders, and managing inventory **3. Vehicle Rental System:** Design a system using classes for vehicles, rental agencies, and rental transactions. Implement methods to handle vehicle availability, rental periods, pricing, and customer bookings.	02	**CO4**

07	1. **GUI for Developing Conversion Utilities:** Develop a Python GUI application that performs various unit conversions such as currency (Rupees to Dollars), temperature (Celsiusto Fahrenheit), and length (Inchesto Feet).The application should include input fields for the values, dropdown menus or buttons to select the type of conversion, and labels to display the results. 2. **GUI for Calculating Areas of Geometric Figures:** Develop a Python GUI application that calculates the areas of different geometric figures such as circles, rectangles, and triangles. Allows users to input the necessary dimensions for various geometric figures and calculate their respective areas. The application should include input fields for the dimensions, buttons to perform the calculations, and labels to display the results. 3. **College Admission Registration Form:** The college admission registration form collects essential personal, educational, and contact information from prospective students. Create a GUI as shown in Figure-1 that allows the user to input his/her name, branch and Favorite game. When the user clicks the Submit button,it should display the output as illustrated.	02	**CO5**
08	1. **Script to Validate Phone Number and Email ID *:** Write a Python script that prompts the user to enter their phone number and email ID. It then employs Regular Expressions to verify if these inputs adhere to standard phone number and email address formats 2. **Password Strength Checker:** Write a Python script that prompts the user to enter a password. Use regular expressions to validate the password based on these criteria: At least 8 characters long, Contains at least one uppercase letter, one lowercase letter, one digit, and one special character. 3. **URL Validator:** Develop a script that verifies if a given string is a valid URL. Use regular expressions to check for standard URL formats, including protocols (http, https), domain names, and optional path segments. Test with various URLs and ensure the validation covers common cases. 4. **Extracting Data from Text *:** Create a program that reads a text file containing various data (e.g., names, emails, phone numbers). Use regular expressions to extract specific types of data, such as email addresses, phone numbers, dates (e.g., MM/DD/YYYY format).	02	**CO5**
09	1. **Creating and Manipulating Arrays*:** Write a Python program to create a 1D, 2D, and 3D NumPy array. Perform basic operations like reshaping, slicing, and indexing. 2. **Array Mathematics*:** Develop a Python script to create two arrays of the same shape and perform element-wise addition, subtraction, multiplication, and division. Calculate the dot product and cross product of two vectors. 3. **Statistical Operations*:** Write a Python program to calculate mean, median, standard deviation, variance, and correlation coefficients of a given array.	02	**CO6**

Note: * Marks indicate the minimum required programs to be taken. Additional programs should be covered based on the student's learning pace.

Practical Projects and Case Studies:

Industry-Specific Projects: Developing projects that address real-world problems in specific industries, such as finance, manufacturing, or healthcare.

Machine Learning Applications: Building projects like predictive modeling, image recognition, or natural language processing.

Web Application Development: Developing a web application for a specific business need.:

Assessment:

Practical& Oral Exam: A Practical & Oral exam will be held based on the above syllabus.

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASCC11101	CC	Basics of Photography and Visual Communicatior	-	-	2#	-	2	-	-		1

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASCC11101	Basics of Photography and Visual Communication	30	30	20	20	100	2

Course Objectives:

By the end of this course, students will be able to:

1. Understand the scientific and historical foundations of photography, including camera mechanics and light behavior.
2. Explore the technical aspects of focus, lens types, image formats, and digital file handling.
3. Apply the principles of visual composition using elements like line, shape, color, texture, and space.
4. Analyze and interpret form and content in photographic and visual communication contexts.
5. Develop skills in basic visual design using tools like Canva, MS PowerPoint, and slideshow creation.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASCC111xx.1	Explain the basic science behind photography, including the role of light, exposure, and camera components.	L2
ASCC111xx.2	Demonstrate the use of camera settings, focus techniques, and lens choices to capture high-quality images.	L5
ASCC111xx.3	Identify and apply appropriate digital file types and manage a basic digital workflow for storing and editing images.	L3

ASCC111xx.4	Critically analyze photographs and visual messages in terms of form, content, and communication intent.	L4
ASCC111xx.5	Create visually consistent designs and presentations using Canva and MS PowerPoint that reflect professional standards.	L6
ASCC111xx.6	Analyze and interpret form and content in photographic and visual communication contexts.	L4

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5: Evaluate**	**L6: Create**

DETAIL SYLLABUS:

Sr. No	Module	Detailed Content	Hrs	CO
I	**Introduction and Science of Photography**	Introduction to Photography – The science of photography – Image formation (Properties of light and how a camera functions) – Brief history of photography – The transition from film to digital. **Activity: Camera Walk: Manual Mode Exploration** • **Objective**: Learn basic camera settings (ISO, shutter speed, aperture). • **Activity**: Students go on a 1-hour campus photo walk using manual mode only. They must take at least 5 photos under different lighting conditions. • **Outcome**: Understand how to balance exposure using the exposure triangle.	**4**	**CO1**
II	**Light**	Understanding light – Correct, under- and over-exposure – The exposure triangle – Shutter speed – Aperture – ISO – Depth of field (DOF). **Activity:** Rule of Thirds Scavenger Hunt **Objective:** Practice composition using the Rule of Thirds. • **Instructions:** Give participants a simple grid overlay or ask them to enable the grid on their camera/phone. • **Task:** Capture 5 photos where the subject is aligned along one of the grid lines or at an intersection. • **Example Prompts:** A person, a tree, a building, an animal, and a cup or object.	**4**	**CO2**
III	**Focus, Lens, File Types and Digital Workflow**	Taking pictures in-focus – Different types of lens and their perspective/angle of view – Basic camera shots: sizes and angles – File types (RAW, JPG, TIFF, etc.) – Digital workflow and to download, organize and backup files for easy retrieval. **Activity: Visual Storytelling with 5 Frames** • **Objective**: Understand narrative through visual sequencing. • **Activity**: Students create a photo story in **5 images** that	**5**	**CO4**

		tell a beginning, middle, and end without using text. **Outcome**: Develop storytelling and shot planning.		
IV	**Composition, Visual Elements, Form and Content**	Composition: Making a picture with visual elements of design, colour, texture, tone, line, shape, symmetry, asymmetry, perspective, negative space, pattern and visual weight to create visually stimulating and storytelling frames – Understanding the relationship between form and content – Shooting with output in mind – Horizontal and vertical formats/frames. **Activity: Composition Challenge** ● **Objective**: Apply rules of composition (rule of thirds, leading lines, symmetry, etc.). ● **Activity**: Capture 7 photos, each based on a different rule of composition. ● **Outcome**: Recognize and implement effective framing techniques.	**5**	**CO4**
V	**Design, Canva, Slideshows, MS PPT and Consistency**	Designing skills – Using online tools such as Canva – Processing images, creating the desired illustrations and photo editing – Tools for editing and saving images with high resolution for printing, uploading on the web and e-mailing effectively – Creating slideshows, multimedia presentations using PowerPoint presentations/Google Slides. **Activity: Recreate a Famous Photograph** ● **Objective**: Study the work of iconic photographers. ● **Activity**: Choose a famous photograph and replicate it as closely as possible in terms of lighting, composition, and emotion. ● **Outcome**: Learn from the masters and analyze photo construction.	**4**	**CO5**
VI	**Self-Learning**	● Read new and advanced research. ● Analyze famous images. ● Create your own Magazine in the form of a story	**4**	**CO6**
Total			**26**	

Text books:

1. Langford, Michael, et al. *Langford's Basic Photography: The Guide for Serious Photographers*. 10th ed., Focal Press, 2010.
2. Hedgecoe, John. *The New Manual of Photography*. DK Publishing, 2003.
3. Kelby, Scott. *The Adobe Photoshop Lightroom Book for Digital Photographers*. New Riders, 2022.
4. Freeman, Michael. *The Photographer's Eye: Composition and Design for Better Digital Photos*. Focal Press, 2007.
5. Peterson, Bryan. *Learning to See Creatively: Design, Color, and Composition in Photography*. Revised ed., Amphoto Books, 2015.
6. Berger, John. *Ways of Seeing*. Penguin Books, 2008.
7. Barthes, Roland**.** *Camera Lucida: Reflections on Photography*. Translated by Richard Howard, Hill and Wang, 1981.

8. Reynolds, Garr. *Presentation Zen: Simple Ideas on Presentation Design and Delivery*. 3rd ed., New Riders, 2019.
9. Duarte, Nancy. *Slideology: The Art and Science of Creating Great Presentations*. O'Reilly Media, 2008.
10. Canva Design School. *Design Essentials: A Beginner's Guide to Canva*. Canva, 2023.

Online References:

1. http://bethecamera.com/
2. http://www.canonoutsideofauto.ca/play/
3. https://camerasim.com/camerasim-free-web-app/
4. https://www.adorama.com/alc/10-online-camera-simulators-to-improveyour photographyskill
5. http://bethecamera.com/
6. http://www.canonoutsideofauto.ca/play/
7. https://camerasim.com/camerasim-free-web-app/
8. https://www.adorama.com/alc/10-online-camera-simulators-to-improveyor- Photographyskill

Suggested Pedagogy and assessment criteria for Teachers:

1. Project-based activities.
2. Presentation, Group Discussions, and Case studies.
3. Flip class mode/ Roleplay
4. Quiz MCQ

JNIESTRT

Smt. Indira Gandhi College of Engineering

Estd. : 1993-94

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)

Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASCC11102	CC	Health, Wealth and Mindfulness	-	-	2#	-	2	-	-		1

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASCC11102	Health, Wealth and Mindfulness	30	30	20	20	100	2

Course Objectives:

1. To recall key concepts of health and wellness, including definitions, importance, and types (physical, mental, social, and spiritual)
2. To explain the role of essential nutrients in maintaining health and the impact of balanced and unhealthy diets.
3. To demonstrate the ability to create a personalized health plan, incorporating proper diet, exercise, and stress management techniques.
4. To analyze the causes and effects of various lifestyle-related diseases and evaluate the effectiveness of prevention and management strategies.
5. To evaluate different stress management techniques and hygiene practices to determine their effectiveness in maintaining mental and physical health.
6. To design mindfulness activities and health improvement strategies, applying their knowledge to real-world scenarios and promoting well-being.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASCC111xx.1	Identify and define key concepts related to health and wellness, such as different types of health, common diseases, and essential nutrients.	L1
ASCC111xx.2	Describe the importance of a balanced diet, healthy lifestyle choices, and the impact of poor nutrition and substance abuse on overall well-being.	L6

ASCC111xx.3	Implement personalized health plans and practice healthy eating habits, regular exercise, and stress management techniques.	L4

ASCC111xx.4	Examine and compare different causes of lifestyle diseases and assess the role of physical activity, yoga, and proper diet in disease prevention.	L4
ASCC111xx.5	Judge the effectiveness of various hygiene practices and different stress management methods.	L3
ASCC111xx.6	Formulate and propose innovative mindfulness exercises and wellness strategies, tailored to their needs, promoting a holistic approach to health.	L6

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5: Evaluate**	**L6: Create**

DETAILED SYLLABUS:

S.No	Module	Detailed Content	Hrs	CO
I	**The foundations of healthful living and Wellness**	- Describe and distinguish between Health and Wellness, Importance of health and wellness Education. Physical, social, mental, spiritual health and its relevance to everyday life Body systems and common diseases. - Substance abuse (Drugs, Cigarettes, Alcohol), de-addiction, counselling and rehabilitation. - Information about Health organizations: World Health Organization (WHO) United Nation Educational Scientific & Cultural Organization (UNESCO) Integrated Child Development Services (ICDS) Ministry of Health & Family Welfare (MHFW) **Activity:** Divide the students into small groups and assign each group a specific lifestyle choice (Healthy or Unhealthy) to explore. Request that they talk to the class about the possible impacts on health and share their insight.	**5**	**CO1**
II	**Diet and Nutrition for Health and Wellness**	- Essentials of nutrients and their function in maintaining good health. - Components of a balanced diet for healthy living. Malnutrition, undernutrition and overnutrition. - Processed foods and unhealthy eating habits. Importance of organic foods. **Activity**: Establish a Customized Health Plan for each student. Pick an Important Subject: Select a certain health-related subject, such as Healthy Diets, Eating Habits, Traditional ways of eating, Impact of unhealthy eating on Health and wellness Script Development: Write a script that blends artistic aspects with educational material.	**4**	**CO2**

III	**Management of Health and Wellness**	- Healthy foods for prevention and progression of Cancer, Hypertension, Cardiovascular, and metabolic diseases (Obesity, Diabetes, Polycystic Ovarian Syndrome). -Importance of Physical Fitness, Spirituality and its Health benefits. - Prevention and management of sedentary lifestyle diseases through exercise. - Role of Yoga, in maintaining physical and mental health. **Activity:** Discussion forums for diseases which they came across in the surrounding. Case studies related to health issues	**4**	**CO4**
IV	**Stress Awareness and Management**	- Understanding Stress, Sources and Causes of Stress, Physiological and Psychological Effects, Coping Mechanisms and Strategies, Stress Management Programs, Resilience and Stress Recovery **Activity:** Discussions about stress-reduction strategies. Role plays on Stress Management and Awareness	**4**	**CO4,5**
V	**Hygiene, Personal Hygiene, Mental Hygiene & Community Hygiene**	- Meaning, Concept and Types of Hygiene. Importance of Hygiene for healthy life (Personal Hygiene, Mental Hygiene). **Activity:** Students will present their understanding of hygiene and will share ways to improve it.	**4**	**CO5**
VI	**Mindfulness**	- Foundation of Mindfulness, Mindfulness in action, Meditation techniques Brainstorming sessions for improving logical reasoning, thinking ability Activities to recognize and manage thoughts, emotions, and actions **Activity:** Activities: Groupwise Activities can be conducted	**5**	**CO6**
Total			**26**	

Text books:

1. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell.
2. Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021.
3. Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve Well-Being by Nashay Lorick, 2022
4. Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu& Jeff Lumiri , 2018.
5. Physical Activity and Mental Health by Angela Clow & Sarah Edmunds, 2013
6. Yoga for Beginners: A Practical Guide" by Iyengar B.K.S, Dorling Kindersley,2006
7. Emotional Intelligence: Why It Can Matter More Than IQ By Daniel Goleman,Bantam, 2006
8. Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones by James Clear, Penguin,2018

Online References:

1. https://www.psychologytoday.com/us/basics/resilience/building-resilience
2. https://mindfulness.org/relaxation-techniques/
3. https://www.health.harvard.edu/staying-healthy/how-stress-affects-your-health
4. https://www.mindtools.com/pages/article/newLDR_78.htm
5. https://www.mayoclinic.org/symptoms/stress/basics/definition/sym-20050973
6. https://www.nimh.nih.gov/health/topics/stress/index.shtml
7. https://www.stress.org.uk/cognitive-behavioural-therapy-cbt/

Suggested Pedagogy and assessment criteria for Teachers:

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4. Quiz MCQ

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Scheme Name : SIGCE25R0

Course Code	Course Category	Course Description	Teaching Scheme (Contact Hours)					Credit Assigned			
			L	T	P	SL	TE	L	T	P	Total Credits
ASCC11103	CC	Social Science and Community Services	-	-	2#	-	2	-	-		1

Course Code	Course Description	Examination Scheme					
		Continuous Assessment Tests (CAT)					
		ACT%	AS/CS/Q%	A %	ESE	Total	Credits
ASCC11103	Social Science and Community Services	30	30	20	20	100	2

Course Objectives:

1. Understand foundational concepts in sociology, psychology, and political science relevant to engineering.
2. Critically evaluate the impact of computing technologies on society and culture.
3. Apply ethical reasoning to real-world technical problems.
4. Engage in community development through structured service-learning.
5. Demonstrate teamwork, leadership, empathy, and social responsibility.

Course Outcomes:

Code	Course Outcomes	Bloom's Level
ASCC111xx.1	Explain key social science concepts and their relevance to technological development.	L2
ASCC111xx.2	Analyze social and ethical issues in computing and digital transformation.	L4
ASCC111xx.3	Design and implement community service initiatives with measurable impact.	L3
ASCC111xx.4	Reflect on the social roles and responsibilities of engineers.	L3

ASCC111xx.5	Demonstrate teamwork, leadership, empathy, and social responsibility.	L3

BLOOM'S Levels Targeted

L1: Remember	**L2: Understand**	**L3: Apply**	**L4: Analyze**	**L5: Evaluate**	**L6: Create**

DETAILED SYLLABUS:

Sr No	Title	Content	Hrs	CO
I	**Introduction to Social Science/Community Service**	- Definition, branches, and significance - Interrelation with engineering - Introduction to Community Service - Types of service Activity: 1- Ice-breaker activity 2- Group discussion 3- Tree Plantation	**6**	**CO1**
II	**Sociology and Community for Engineers**	-Society, culture, institutions - Norms, values, roles, socialization - Community structures, diversity, and needs Activity: Group activity: 1- Cultural Simulation 2- Book Donation 3- Treat for Tails 4- Tree plantation	**6**	**CO2**
III	**Social Change & Technological Evolution**	Industrialization to digital society Technology as a driver of social change Activity: 1- Social Awareness Campaign (Social Issue) 2- Nukkad natak (Role Play) Case Analysis: social media and Social Movements Literacy Programs (Help adults to improve their literacy programs like awareness p\of public government policies)	**5**	**CO3**
IV	**Counselling and Support Services**	Cleanliness Awareness or beach Clean-up (Organize or participate in neighbourhood or park or beach clean-up events) Blood Donation Charity - Old Age Home (Volunteer at a nursing home, providing companionship or assistance with activities.) Food Drive (Organize or participate in food drives to collect and donate non-perishable items)	**5**	**CO4**
V	**Self-Study Community activities**	Explore the new community researches Presentation and Reflection Research Articles	**4**	**CO5**
Total			**26**	

Recommended references

1. "Introduction to Sociology" – Anthony Giddens
2. "Essentials of Psychology" – Douglas Bernstein
3. UN Sustainable Development Goals Toolkit
4. National Social Welfare Policies and Legal Handbooks

Suggested Pedagogy and assessment criteria for Teachers:

1. Project-based activities.
2. Presentation, Group Discussions, and Case studies.
3. Flip class mode/ Roleplay
4. Quiz MCQ
5. Activities as per the modules: 05