VIT | Vidyalankar Institute of Technology
Accredited A+ by NAAC

Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

Bachelor of Technology

in

Computer Engineering

First Year Scheme & Syllabus

(As per NEP 2020, with effect from the Academic Year 2023-24)

Preamble

The National Education Policy (NEP) framework aims to break the mould from teacher centric to student centric educational practices. It empowers the students with flexibility in terms of choosing courses across different faculties and mode of learning.

This multidisciplinary approach will encourage learners to follow their passion and inherent interests. The learner is free to learn at a pace that he is comfortable with and this enables life long learning. It also enhances the scope for holistic personality development.

This premise is truly reflected in preamble of the NEP document, "The future of nation is decided in the classrooms of the schools and colleges today".

Details of implementation:

NEP curriculum framework enables us to accelerate change, redesign systems with equity in mind, respond to feedback, encourage collaboration, catch and pollinate ideas and create a culture of research and development. It will allow us to offer the required academic flexibility which will focus on improving competency level of students with diverse strengths.

The curriculum planned by VIT has vertical Program Courses consisting of core courses (PCC) of branch of engineering positioned and sequenced to achieve sequential and integral learning of the entire breadth of the specific branch. This vertical also includes Professional elective courses (PEC) which offer flexibility and diversity to learners to choose specialization from a basket of recent developments in their field of technology. The selection of unique professional elective courses based on industrial requirements and organizing them into tracks is a special feature of this curricula ensuring employability.

The vertical Multidisciplinary Courses consists of Open Elective (OE) courses and multidisciplinary minor (MD M) courses. Special vocational and skill development courses are included as a part of Skill courses vertical that make student capable to work in industrial environment.

The student is expected to demonstrate their ability through course in Experiential Learning Courses vertical like internships/On Job Training, Community Engagement Project, Real Industry Project/ research problem. Our curriculum also introduces Social Service Internship and Internship with institutes abroad along with courses like Design Thinking. This will lead to creation of products and/ or patents through this program.

For holistic development of students, apart from technical courses, Ability Enhancement Courses, Entrepreneurship/Economics/Management Courses, Indian Knowledge System and Value Education courses from vertical Humanities and Social Science and Management develop the required soft-skills and attitude amongst learners.

In Liberal Learning vertical. courses like Various Dance Forms, Global citizenship Education, Facets of Astronomy etc. aims to create balance in brain hemispheres and hence improve learners' clarity in thoughts and responses.

In addition to core courses, professional and open electives; our framework offers honor degree in each programme of engineering. It includes specialized courses along with field/ domain study that make student capable of working on industry relevant problems.

Chairman, Board of Studies
Department of Computer Engineering
Vidyalankar Institute of Technology

Chairman, Academic Council
Vidyalankar Institute of Technology

First Year B. Tech. Computer Engineering **Preferred Semester: I**

Course Structure and Assessment Guidelines

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS01	Engineering Mathematics-I	Theory	3	20	30	50	100
ESC	ES01T	Engineering Graphics	Theory	2	15	20	40	075
ESC	ES01P	Engineering Graphics Lab	Practical	1	25	-	25	050
ESC	ES06T	Fundamentals of Computer Hardware and Networking	Theory	2	15	20	40	075
ESC	ES06P	Fundamentals of Computer Hardware and Networking Lab	Lab	1	25	-	25	050
ESC	ES07T	Fundamental of Logic Circuits	Theory	2	15	20	40	075
ESC	ES07P	Fundamental of Logic Circuits Lab	Lab	1	25	-	25	050
SC_VSEC	ES04T	Structured Programming	Theory	2	15	20	40	075
SC_VSEC	ES04P	Structured Programming Lab	Lab	1	25	-	25	050
HSSM_AEC	HS01T	Effective Communication	Theory	2	15	20	40	075
HSSM_AEC	HS01P	Effective Communication lab	Practical	1	25	-	25	050
LLC_CC	GEXX*	Any LLC_CC course from the list	Theory	2	As per course			
Total Credits				**20**				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESE= End Semester Examination

*Selection based on the subset of courses made available by the Institute for the semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

First Year B. Tech. Computer Engineering **Preferred Semester: II**

Course Structure and Assessment Guidelines

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS03	Engineering Mathematics-II	Theory	3	20	30	50	100
BSC	BS14T	Physics	Theory	2	15	20	40	075
BSC	BS14P	Physics Lab	Lab	1	25	-	25	050
ESC	ES10	Computer Organization and Architecture	Theory	3	20	30	50	100
PC_PCC	CE01T	Data Structure	Theory	2	15	20	40	075
PC_PCC	CE01P	Data Structure Lab	Practical	1	25	-	25	050
SC_VSEC	ES05T	Object-Oriented Programming	Theory	2	15	20	40	075
SC_VSEC	ES05P	Object-Oriented Programming Lab	Lab	1	25	-	25	050
HSSM_EEMC	GECI01	Design Thinking	Theory	3	50	-	50	100
LLC_CC	GEXX*	Any LLC_CC course from the list	Theory	2	As per course			
Total Credits				**20**				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESE= End Semester Examination
*Selection based on the subset of courses made available by the Institute for the semester.

Liberal Learning/ Co-curricular Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	GEA02	Various Dance Forms	2	-	-	2	Any
2	GESB05	Global Citizenship Education	2	-	-	2	Any
3	GEPEW01	Wellness – Body, Mind & Spirit	2	-	-	2	Any
4	GEPEW02	IQ vs EQ	2	-	-	2	Any
5	GEPEW03	Nutrition and Physical Wellness	2	-	-	2	Any
6	GENS01	Facets of Astronomy	2	-	-	2	Any

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Detailed syllabus of First Year Semester-I

Course Name: Engineering Mathematics-I

Course Code: BS01

NEP Vertical _Basket: Basic Science

Preamble:

The objective of the course is to impart knowledge of De-Moivre's Theorem, Hyperbolic Functions, and Logarithm of Complex Numbers. The course clarifies the concept of Partial Differentiation and its applications. The course will enable learners to learn different methods of solving improper and Multiple Integral.

Pre-requisites:

Nil

Course Objectives:

- To recall and remember basics of complex numbers, differential calculus and Integral Calculus
- To understand the concepts of basic mathematical methods for Complex Numbers, Partial Differentiation and Multiple Integrals.
- To apply mathematical methods to solve engineering problems
- To solve and evaluate the problems using, complex numbers, Special Functions, Multiple Integrals and differential calculus

Course Outcomes:

Learner will be able to:

CO1: Illustrate the basic concepts of Complex Numbers and solve problems involving differentforms and properties of complex numbers.

CO2: Apply the knowledge of complex numbers to solve problems in hyperbolic functions and logarithmic function.

CO3: Apply concept of Beta & Gamma functions and DUIS to solve improper integrals.

CO4: Find partial derivatives of multivariable functions and apply Euler's theorem to prove results about Homogeneous functions.

CO5: Apply the concept of partial differentiation to find maxima and minima of multivariable functions.

CO6: Illustrate the concept of Double Integration to evaluate Double Integration in cartesian andpolar form.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
3	-	3	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	20	30	50	100

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
1	Complex Numbers	Statement of De Moivre's Theorem and related Examples Expansion of $\sin^n \theta$, $\cos^n \theta$ in terms of sines and cosines of multiples of θ and Expansion of sinnθ, cosnθ in powers of sinθ, cosθ Powers and Roots of complex number	7
2	Hyperbolic function and Logarithm of Complex Numbers	Circular functions of complex number and Hyperbolicfunctions. Inverse Circular and Inverse Hyperbolic functions. Separation of real and imaginary parts of all types ofFunctions. Logarithmic functions, Separation of real and Imaginaryparts of Logarithmic Functions.	7
3	Special Functions	Beta and Gamma functions with properties Differentiation under integral sign with constant limits of integration (without proof)	7
4	Partial Differentiation & Applications	Partial Differentiation of first and higher order. Differentiation of composite function. Maxima and minima of a function of two independentvariables	8
5	Multiple Integration-I	Double integration-Definition, Evaluation of Double Integrals. (Cartesian & Polar) Evaluation of integrals over the given region. (Cartesian& Polar)	8
6	Multiple Integration-II	Evaluation of double integrals by changing the order ofintegration. Evaluation of double integrals by changing to polar coordinates.	8
Total			**45**

Text Books:

1. Ramana B.V.,"Higher Engineering Mathematics",12th edition, Tata MCGraw Hill,2017
2. Seymour Lipschutz,"Beginning Linear Algebra", 6th edition, Schaum's outline series,2012

Reference Books:

1. Dr. B.S. Greswal," Higher Engineering Mathematics",9th Edition, Khanna Publication,2012
2. Erwin Kreysziq ,"Advanced Engineering Mathematics",9th Edition, Wiley Eastern limited ,2012
3. Srimanta Pal and Subidh C. Bhunia," Advanced Engineering Mathematics", UK Edition, Oxford Press,2015
4. H.K. Das," Advanced Engineering Mathematics",17th Edition, S, Chand,2008

Course Name: Engineering Graphics

Course Code: ES01T

NEP Vertical _Basket: Engineering Science

Preamble:

To improve the visualization skills of the learners, with imparting the learner's ability to read a drawing. This course also imparts and inculcate learners to understand the theory of projection.

Pre-requisites:

Nil

Course Objectives:

- To understand the concepts of the Engineering Graphics.
- To know how to use drawing instruments for drafting and dimensioning.
- To understand visualisation technic and skills of Engineering Graphics.
- To know the Construction of 3D object.
- To introduce the tools of Computer Aided drafting (CAD).

Course Outcomes:

Learner will be able to:
CO1: Understand conventional method and usage of CAD software.
CO2: Apply the basic principles of projections and visualization to communicate ideas graphically.
CO3: Construct the drawing of curves, points, straight lines, and planes using concept of projections.
CO4: Interpret the three-dimensional pictorial objects and represent in two-dimensional views.
CO5: Construct three dimensional shapes from two dimensional views using the concept of projections.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	**ISA**	**MSE**	**ESE**	**Total**
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
1	Introduction to Engineering Graphics and CAD	Introduction and importance of engineering graphics. Introduction of different types of the quadrants, method of projection, lines and dimensioning. Drawing instruments and their usage. Introduction Computer Aided Design and Drafting (CADD or CAD) software and operations, menu system and toolbars.	3
2	Engineering Curve	Basic construction of cycloid, involutes, and helix of cylinder.	4
3	Projection of points, lines	Projections of lines, inclined to both the reference planes HP and VP as per the first angle projection method.	4
4	Projection of Planes	Projection of rectangular, triangular, square, pentagonal, hexagonal, and circular planes, inclined to both the reference planes HP and VP as per the first angle projection method.	4
5	Orthographic Projections	Drawing orthographic views from pictorial projections. Sectional orthographic Projections of a simple machine part as per the first angle projection method. - By drafting in the sketchbook as well as on CAD software. CAD Drawing: Applying dimensions to objects, applying annotations to drawings, setting up and use of layers, changing of the line properties, Printing setup and procedure. Different CAD Tools and usage- Draw tools, modify tools, properties, copy selection, dimensioning and editing (text height and arrow size).	9
6	Isometric Views	Drawing Isometric views from given views of simple blocks with plane, cylindrical surfaces, and circular holes. - By drafting in the sketchbook as well as on CAD software CAD Drawing: Switching to isometric drafting mode, switch /change to different ISO planes, ISO circles on different ISO planes, Different CAD Tools and usage- Draw tools, Modify tools, Properties of line.	6
Total			**30**

Text Books:

1. N.D. Bhatt, "Engineering Drawing (Plane and solid geometry)", 53rd Edition, Charotar Publishing House Pvt. Ltd.
2. N.D. Bhatt & V.M. Panchal, "Machine Drawing",50th edition, Charotar Publishing House Pvt. Ltd.
3. Dhananjay A Jolhe, "Engineering Drawing" 1st edition, Tata McGraw Hill

Reference Books:

1. Prof. Sham Tickoo (Purdue University) & Gaurav Verma, "(CAD Soft Technologies): Auto CAD 2012 (For engineers and Designers)", Dreamtech Press New Delhi, 2012
2. "Learning AutoCAD", Autodesk Official Training Guide, 2009

Course Name: Engineering Graphics Lab

Course Code: ES01P

NEP Vertical _Basket: Engineering Science

Preamble:

This course improves the visualization skills of the students, with imparting the student's ability to read a drawing. This course also imparts and inculcate students to understand the theory of projection.

Pre-requisites:

Nil

Course Objectives:

- To impart the knowledge of reading a drawing.
- To Use AutoCAD for daily working process.
- To teach basic utility of Computer Aided drafting (CAD) tool.

Course Outcome:

Student will be able to:
CO1: Apply the basic principles of projections in 2D drawings using a CAD software.
CO2: Create, Annotate, Edit and Plot drawings using basic AutoCAD commands and features.
CO3: Apply the concepts of layers to create drawing.
CO4: Apply basic AutoCAD skills to draw different views of a 3D object.
CO5: Apply basic AutoCAD skills to draw the isometric view from the given two views.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Practicals:

Sr. No.	List of Practicals to be performed using AutoCAD
1	Draw: Types of the lines, circle, Polygons, dimensioning, and nameplate.
2	Draw: Bridge Rectifier Circuit
3	Draw: Projection of Planes
4	Draw: Orthographic Projection (without section)
5	Draw: Orthographic Projection (with section)
6	Problem Based Learning (PBL) /mini project on Orthographic Projections
7	Draw: Isometric Views
8	Problem Based Learning (PBL) /mini project on isometric views

Reference Books:

1. Narayana, K.L. & P Kannaiah (2008), Textbook on Engineering Drawing, Scitech Publisher.
2. Prof. Sham Tickoo (Purdue University) &GauravVerma, "(CAD Soft Technologies) : Auto CAD 2012 (For engineers and Designers)", Dreamtech Press NewDelhi.
3. Dhananjay A Jolhe, "Engineering Drawing" Tata McGraw Hill.
4. N.D. Bhatt, "Engineering Drawing (Plane and solid geometry)", Charotar Publishing House Pvt. Ltd.
5. N.D. Bhatt & V.M. Panchal, "Machine Drawing", Charotar Publishing House Pvt. Ltd.
6. Kendrol Phillips, "AutoCAD beginner's guide"

Course Name: Fundamentals of Computer Hardware and Networking

Course Code: ES06T

NEP Vertical _Basket: Engineering Science

Preamble:

Study of computer hardware describes the basic structure of computer system and different ways of communicating with I/O devices and standard I/O interfaces. Network Fundamentals course provides the learners a clear understanding of how computer networks from local area networks to the massive and global Internet are built, how they allow computers to share information and communicate with one another. This course covers the physical aspects of computer hardware and computer network.

Pre-requisites:

NIL

Course Objectives:

- To introduce physical components and devices of a general-purpose computer
- To provide in-depth knowledge of the functions of different parts of computer
- To focus on balance between access time and cost in storage devices
- To introduce learner with the science of connectivity and networking between computing devices

Course Outcomes:

Learner will be able to:
CO1: To understand the organization and architecture of computer systems
CO2: To understand memory managment of computer system
CO3: To understand input-output organization
CO4: To introduce concepts and fundamentals of data communication and computer networks
CO5: Understand the concept of different communication medium
CO6: Understand networking concepts with reference to different types of models and topologies, study of different networking device

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No of Hours
1	Fundamentals of computer system	Introduction, Basic orgnization of computer, Functional block diagram of computer system.	4
2	Memory	Memory hierarchy, Characteristics of memory, Classification of primary and secondary memory, Memory types	5
3	I/O Devices and their interfaces	Common I/O device types and characteristics, Introduction to buses, Introduction to peripheral devices of computer system.	6
4	Types of Networks	Introduction to computer network, network application, network software and hardware components, Features of computer network, types of network architecture (Peer-Peer, Client-Server), Computer Network types (LAN, MAN, WAN), Network Topologies (Bus, Ring, Tree, Mesh, Star, Hybrid), Transmission modes (Simplex, Half-Duplex, Full-Duplex).	6
5	Introduction to wired and wireless Network	Characteristic of wired network, need of wireless network, Introduction to different types of comunication medium: Wired and Wireless medium, Wired Transmission Media: Twisted pair, coaxial cable, optical fiber cable, Wireless Transmission: Microwave Links, Satellite communication, Mobile communication, RF communication, Ground wave, Sky wave, space wave, Comparison of wired	5
6	Overview of ISO-OSI layer and Network Devices	Overview of Networking, Need for Networking, Layered architecture, Introduction to ISO-OSI, OSI reference model, TCP/IP Model, Different Network devices usen in networking: Hub, Bridge, Switch, Router, Gateway.	4
Total			**30**

Textbooks:

1. Ron Gilster, "PC Hardware-A Beginners Guide", McGraw-Hill
2. A.S. Tanenbaum," Computer Networks",4th edition, Pearson Education
3. B.A. Forouzan, "Data Communications and Networking", 5th edition, Tata McGraw Hill

Reference Books:

1. Alan Clements, "Principles of Computer Hardware", 4th edition, Oxford University Press
2. Natalia Olifer & Victor Olifer, "Computer Networks: Principles, Technologies & Protocols for Network Design", Wiley India
3. Larry L.Peterson, Bruce S.Davie, "Computer Networks: A Systems Approach", 2nd Edition, The Morgan Kaufmann Series in Networking

Course Name: Fundamentals of Computer Hardware and Networking Lab

Course Code: ES06P

NEP Vertical _Basket: Engineering Science

Preamble:

Study of computer hardware describes the basic structure of computer system and different ways of communicating with I/O devices and standard I/O interfaces. Network Fundamentals course provides the learners a clear understanding of how computer networks from local area networks to the massive and global Internet are built, how they allow computers to share information and communicate with one another. This course covers the physical aspects of computer hardware and computer network.

Pre-requisites:

NIL

Course Objectives:

- To introduce physical components and devices of a general-purpose computer
- To provide in-depth knowledge of the functions of different parts of computer
- To introduce learner with network cables and crimping tool
- To introduce learner with the science of connectivity and networking between computing devices

Course Outcomes:

Learner will be able to:
CO1: To understand PC assembling and dismantling
CO2: To understand and identify various components of motherboard, RAM and ports
CO3: To use crimping tool and connect network cables
CO4: To learn basic network commands and to use packet tracer tool
CO5: To build simple network topology
CO6: To connect computers in a Local Area Network

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Practicals:

Sr No.	Title of Practicals
1	PC assembling and dismantling.
2	Identify motherboard components, RAM identification, removal, installation.
3	Identifying external ports, PC cards and interfacing.
4	Study of RJ45 and CAT6 Cabling and connection using crimping tool
5	Use basic networking commands in Linux (ping, tracert, nslookup, netstat, ARP, RARP, ip, ifconfig, dig, route)
6	Study and understand packet tracer tool
7	Build a simple network topology and configure it using packet tracer
8	Connect the computers in Local area network

Textbooks:

1. Ron Gilster, "PC Hardware-A Beginners Guide", McGraw-Hill
2. A.S. Tanenbaum," Computer Networks",4th edition, Pearson Education

Reference Books:

1. Alan Clements, "Principles of Computer Hardware", 4th edition, Oxford University Press
2. Natalia Olifer & Victor Olifer, "Computer Networks: Principles, Technologies & Protocols for Network Design", Wiley India

Course Name: Fundamentals of Logic Circuits

Course Code: ES07T

NEP Vertical _Basket: Engineering Science

Preamble:

This course introduces learners to the understanding of fundamental of Number systems, basic analog-digital circuits like diode, BJT, Gates etc. and their applications. It also gives the insights of Boolean algebra. It will motivate the learners to design combinational logic circuits and demonstrates them during practical.

Pre-requisites:

Nil

Course Objectives:

- To enable learner to recognize numbers in every base
- To express numbers in different coded forms and perform arithmetic operations on them.
- To introduce to BJT as switch, various logic gates and truth tables
- To get acquainted with representation of Boolean expressions, logic diagrams and circuits.

Course Outcomes:

Learner will be able to:
CO1: Understand the various Number systems.
CO2: Apply the knowledge of Number system to perform Arithmetic operations.
CO3: Understand basic electronics circuits and their applications.
CO4: Illustrate the working principle of logic gates.
CO5: Apply the knowledge of Boolean algebra for reduction of Boolean function.
CO6: Design and implement various combinational logic circuits.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment

methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No of Hours
1	Number System	Introduction to Number systems, Binary Number systems, Signed Binary Numbers, Binary, Octal, Decimal and Hexadecimal number and their interconversion.	4
2	Codes & Arithmetic Operations	Codes: Grey, BCD, Excess-3, ASCII, Parity Code, Hamming Code, Binary arithmetic operations using 1's and 2's complement, BCD addition.	5
3	Basic Electronics Circuits	Diode as a switch, Introduction to Bipolar Junction transistor, C-E configuration, Input output characteristics of BJT, Applications of BJT as a Switch.	5
4	Logic Gates	Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Implementation of gates using universal gates, Tri-state buffer.	6
5	Boolean Algebra	Theorems and Properties of Boolean Algebra, Standard SOP and POS form, Reduction of Boolean functions using Algebraic method.	4
6	Combinational Circuits	Introduction to combinational circuits, Half Adder, Full Adder, MUX, DEMUX, Encoder, Decoder, Introduction to Flip Flop: SR, JK, D, T (Truth table), Application of Flip-flop as a memory unit.	6
Total			**30**

Textbooks:

1. R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill.
2. Donald A. Neamen, "Electronic Circuit Analysis and Design", 2nd Edition, TATA McGraw Hill.

Reference Books:

1. M. Morris Mano, "Digital Logic and computer Design", PHI.
2. Robert L. Boylestad, Louis Nashelsky, "Electronic devices and circuit Theory", PHI.
3. Donald P Leach, Albert Paul Malvino, "Digital Principals & Applications", TATA McGraw Hill.

Course Name: Fundamentals of Logic Circuits Lab

Course Code: ES07P

NEP Vertical _Basket: Engineering Science

Preamble:

This course introduces learners to the understanding of fundamental of Number systems, basic analog-digital circuits like diode, BJT, Gates etc. and their applications. It also gives the insights of Boolean algebra. It will motivate the learners to design combinational logic circuits and demonstrates them during practical.

Pre-requisites:

Nil

Course Objectives:

- To enable learner to verify truth tables of different logic gates and to implement various gate functions
- To enable learner to implement reduction of Boolean expressions.
- To enable learner to implement various logic circuits such as half adder, full adder, subtractor, MUX-DEMUX, etc.
- To enable learner to verify truth table of flip-flops.

Course Outcomes:

Learner will be able to:
CO1: Implement different logic gates.
CO2: Design code convertor using logic gates.
CO3: Design and implement various logic circuits.
CO4: Illustrate the working principle of logic gates.
CO5: Apply the knowledge of Boolean algebra for reduction of Boolean function.
CO6: Verification of truth tables of flip-flops.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	**ISA**	**MSE**	**ESE**	**Total**
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Practicals:

Sr No.	Suggested Topic(s)
1.	To verify truth table of different logic gates.
2.	Implement Ex-OR using NAND & NORgate.
3.	To design Binary to gray and Gray to binary code convertor using logic gates.
4.	Reduction of the Boolean expression using Boolean laws & realize it using basic gates.
5.	Design and implement half adder & full adder using logic gates.
6.	Design and implement half subtractor & full subtractor using logic gates.
7.	Design and implement 2:1 MUX using logic gates.
8.	Design and implement 2:1 DEMUX using logic gates.
9.	Realization of logic function using Multiplexer.
10.	Truth table verification of Flip-flops.

Textbooks:

1. R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill.
2. Donald A. Neamen, "Electronic Circuit Analysis and Design", 2nd Edition, TATA McGraw Hill.

Reference Books:

1. M. Morris Mano, "Digital Logic and computer Design", PHI.
2. Robert L. Boylestad, Louis Nashelsky, "Electronic devices and circuit Theory", PHI.
3. Donald P Leach, Albert Paul Malvino, "Digital Principals & Applications", TATA McGraw Hill.

Course Name: Structured Programming

Course Code: ES04T

NEP Vertical _Basket: SC_VSEC

Preamble:

To provide exposure to problem-solving by developing an algorithm, flowchart and implement the logic using C programming language.

Pre-requisites:

NIL

Course Objectives:

- The course aims to provide exposure to problem solving through programming
- It aims to train the students the basic concepts of C programming language
- The course involves lab component to give students hands on experience with the concepts
- It aims to provide exposure to handling data through files

Course Outcomes:

Learner will be able to:
CO1: Understand the fundamentals of a programming language.
CO2: Apply the control structures for code optimization and hence improving efficiency.
CO3: Decompose a problem and solve it using modular programming.
CO4: Demonstrate the use of derived and user derived data types for collection and processing of data.
CO5: Understand the concept of pointers and files to solve the problems related to dynamic and persistent data.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment

methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No of Hours
1	Fundamentals of C	Character Set, Identifiers and Keywords, Data Types, Constants and Variables Operators, Math Library Functions, Expressions, Pre-processor Directives	4
2	Input and Output	Unformatted and Formatted I/0 Function scanf( ) Function printf( ) Concept of Field width, Precision and Flags Basic Programs Based on Computation	2
3	Control Structures	Conditional Branching - if, if-else statement, nested if-else, and switch-case statement. Looping – for loop, while and do-while loop, nested loops Unconditional Branching – break and continue statement	6
4	Functions	Introduction of Functions Declaration and definition of a Function Calling a Function and passing arguments to a Function Concept of Global and Local Variables Storage Classes –Auto, Extern, Static, Register Recursion	6
5	Arrays, Strings and Structures	Array-Concepts, Declaration, Definition, Accessing array element, One-dimensional and Multidimensional array. String- Basic of String, Array of String, Functions in string.h Structure- Declaration, Initialization, Nested structure, Operation on structures, Array of Structure.	6
6	Pointers and Files	Pointer: Pointer Variables, Reference and Dereference Operators, void Pointer, Call by Reference, Pointer Arithmetic, Pointer to Pointer, Pointers and Array, Passing Arrays to Function, Array of Pointers and Dynamic Memory Allocation. Files: Types of File, File operation- Opening, Closing, Creating, Reading, Processing File.	6
Total			**30**

Text Books:

1. K. R. Venugopal and Sudeep Prasad, "Mastering C", Tata McGraw Hill.
2. Behrouz Forouzan, "A Computer Science –Structure Programming Approaches using C", Cengage Learning.
3. Byron S. Gottfried, "Schaum's outlines Programming with C", Tata McGraw Hill.

Reference Books:

1. M. G. Venkateshmurthy, "Programming Techniques through C", Pearson Publication.
2. E. Balaguruswamy, "Programming in ANSI C", Tata McGraw Hill Education.
3. Pradeep Day and Manas Gosh, "Programming in C", Oxford University Press.
4. Yashwant Kanetkar, "Let Us C", BPB Publication

Course Name: Structured Programming Lab

Course Code: ES04P

NEP Vertical _Basket: SC_VSEC

Preamble:

To provide exposure to problem-solving by developing an algorithm, flowchart and implement the logic using C programming language.

Pre-requisites:

NIL

Course Objectives:

- Impart hands on experience with c programming
- Introduce various programming platforms like TurboC, CodeBlocks, Visual Studio
- Train the students towards developing solutions for real world problems using procedure oriented methodology

Course Outcomes:

Learner will be able to:
CO1: Demonstrate the use of datatypes and operators supported by C
CO2: Demonstrate the use of decision making and looping constructs
CO3: Decompose a problem and solve it using functions.
CO4: Develop application to handle large data using arrays and structure
CO5: Demonstrate use of pointers and files

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Practicals:

Sr.no.	Suggested Topic(s)	No. of experiments
1	Computation Based Programs	1
2	Programs using if .. else and nested if .. else	2
3	Programs using switch case	2
4	Programs using for loop	3
5	Programs using while loop	2
6	Programs on Functions	2
7	Programs on Recursion	2
8	Programs using 1D and 2D Arrays	3
9	Programs using Strings	2
10	Programs on Structures	2
11	Programs using Call by Reference	1
12	Programs using Dynamic Memory Allocation	1
13	Programs on Files	2

Suggested List of Assignments:

1. Assignment on tokens
2. Assignment on decision making statements
3. Assignment on looping statements
4. Assignment on arrays
5. Assignment on functions
6. Assignment on structure
7. Assignment on file and pointers

Suggested List of Value-Added Home Assignments:

Practicing problem solving using c on online coding challenge platforms like HackerRank, TopCoder

Suggested Online Courses:

1. Online course on Coursera : https://www.coursera.org/specializations/c-programming
2. Online course on Edx : https://www.edx.org/course/c-programming-getting-started?index=product&queryID=e2368608f2fb78f99be968cfde1b511f&position=1&v=2&linked_from=autocomplete&c=autocomplete

Text Books:

1. K. R. Venugopal and Sudeep Prasad, “Mastering C”, Tata McGraw Hill.
2. Byron S. Gottfried, “Schaum’s outlines Programming with C”, Tata McGraw Hill.

Reference Books:

1. M. G. Venkateshmurthy, “Programming Techniques through C”, Pearson Publication.
2. E. Balaguruswamy, “Programming in ANSI C”, Tata McGraw Hill Education.
3. Yashwant Kanetkar, “Let Us C”, BPB Publication

Detailed syllabus of First Year Semester-II

Course Name: Engineering Mathematics-II

Course Code: BS03

NEP Vertical _Basket: Basic Science

Preamble:

The objective of the course is to impart fundamental knowledge of Rank of Matrix, solve system of linear equations, Eigen values and Eigen Vectors, Caley Hamilton Theorem, find similarity, diagonalization, derogatory and non-derogatory Matrices, n dimensional vector space, Cauchy-Schwarz inequality, Orthogonal Subspaces, and Gram-Schmidt process, Vector Algebra and Calculus including Gradient, Divergence, Curl, Solenoidal and irrotational vector fields.

Pre-requisites:

Nil

Course Objectives:

- To recall and remember basics of matrices, vectors and transcendental equations
- To apply methods to solve engineering problems.
- To solve and evaluate the problems using Matrices, Vector Spaces and Numerical solutions.
- To analyze problems based on Numerical Methods

Course Outcomes:

Learner will be able to:
CO1: Illustrate the concept of rank and rank calculation using various methods.
CO2: Apply the knowledge of rank of Matrix to solve system of linear equations and Solution of system of linear algebraic equations using various methods.
CO3: Apply concept of rank of Matrix to find Eigen Values and Eigen Vectors.
CO4: Apply properties of Matrices to verify Cayley Hamilton Theorem, find similarity, diagonalization, and derogatory Matrices.
CO5: Illustrate the concept and properties of n dimensional vector space, Cauchy-Schwarz inequality, Orthogonal Subspaces, and Gram-Schmidt process.
CO6: Apply Numerical methods to find solution of transcendental equations and system of linear equations.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
3	-	3	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	20	30	50	100

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No of Hours
1	Matrices	Rank of a Matrix using Echelon forms, reduction to normal form, PAQ forms.	7
2	System of Linear Equations	System of homogeneous and non-homogeneous equations, their consistency, and solutions. Linear dependent and independent vectors.	8
3	Eigen values and eigen Vectors	Characteristic equation, Eigen values and Eigen vectors, properties of Eigen values and Eigen vectors.	8
4	Cayley Hamilton Theorem	Cayley-Hamilton theorem (without proof), examples based on verification of Cayley- Hamilton theorem. Similarity of matrices, Diagonalisation of matrices. Functions of square matrix.	7
5	Vector Spaces	Vectors in n-dimensional vector space: properties, dot product, cross product, norm, Vector spaces over real field, properties of vector spaces over real field, subspaces, The Cauchy-Schwarz inequality, Orthogonality, Subspaces, Gram-Schmidt process.	8
6	Numerical Solutions of Transcendental Equations and System of LinearEquations	Solution of Transcendental Equations: Solution by Newton Raphson method and Regula –Falsi Method. Solution of system of linear algebraic equations, by (1) Gauss Jacobi Iteration Method (2) Gauss Seidal Iteration Method.	7
Total			**45**

Textbooks:

1. Ramana B.V.,"Higher Engineering Mathematics",12th edition, Tata MCGraw Hill,2017
2. Seymour Lipschutz,"Beginning Linear Algebra", 6th edition, Schaum's outline series,2012

Reference Books:

1. Dr. B.S. Greswal ,"Higher Engineering Mathematics",9th edition,Khanna Publication,2012
2. Erwin Kreysziq ,"Advanced Engineering Mathematics",9th edition,Wiley Eastern limited ,2012
3. Srimanta Pal and Subidh C. Bhunia ,"Advanced Enginering Mathematics", UK Edition, Oxford Press,2015
4. H.K. Das," Advanced Engineering Mathematics",17th Edition,S,chand,2008
5. Shanti Narayan,"Matrices",10th Edition,S.Chand,2015
6. S. S Sastry,"Introductory Method of Numerical Analysis",5th Edition,PHI,2012

Course Name: Physics

Course Code: BS14T

NEP Vertical _Basket: Basic Science

Preamble:

This course introduces learners to the understanding of fundamental principles of Quantum physics specifically concern to Laser, Fiber, Quantum Mechanics, Quantum Computers and their engineering applications. It also provides problem solving experience in semiconductor physics, in both the classroom and the laboratory learning environment. It will motivate the learners through practical examples that demonstrates the role of physics in progress of engineering disciplines, so as to inculcate the interdisciplinary academic environment.

Pre-requisites:

Nil

Course Objectives:

- Identify and understand the fundamental physical principals underlying engineering devices and processes— a prerequisite to become successful engineers.
- To provide inclusive knowledge of fundamental physical principles encouraging engineering students to venture into the research field.
- To develop scientific temperament for scientific observations, recording, and inference drawing essential for technology studies.
- To give exposure to the topics of fundamental physics in semiconductor and Laser.

Course Outcomes:

Learner will be able to:
CO1: Attain the knowledge of Fermi level in semiconductors and applications of semiconductors in electronic devices.
CO2: Understand the concept of thin film technology using interference and diffraction.
CO3: Illustrate the working principle of various lasers and their applications.
CO4: Understand the concepts of optical fibre and its applications in communication system.
CO5: Illustrate the fundamentals of quantum mechanics and its application
CO6: Attain the knowledge of different sensors and its applications.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
01	Semiconductors Physics	Fermi level, Fermi dirac distribution, Fermi energy level in intrinsic & extrinsic semiconductors, effect of impurity concentration and temperature on fermi level, mobility, current density, Hall Effect, Fermi Level diagram for p-n junction (unbiased, forward bias, reverse bias), Semiconducting devices : LED, Solar Cell, Photo diode	6
02	Interference and Diffraction	Interference by division of amplitude, Interference in thin film of constant thickness due to reflected and transmitted light, Wedge shaped film, Newton's rings, Applications of interference - Determination of thickness of very thin wire or foil, refractive index of liquid, wavelength of incident light, testing of surface flatness, Anti-reflecting films and highly reflecting film. Diffraction: Fraunhofer diffraction at single slit, Diffraction Grating, resolving power of a grating, Determination of wavelength of light using plane transmission grating.	6
03	LASER	Spontaneous emission and stimulated emission, metastable state, Population inversion, types of pumping, resonant cavity, Einsteins's equations, Helium Neon LASER, Nd-YAG LASER, Semiconductor LASER, Applications of LASER- Holography	4
04	Fibre Optics	Numerical Aperture for step index fibre; critical angle;angle of acceptance; V number; number of modes of propagation; types of optical fibres; Application: Fibre optic communication system.	4

05	Quantum Physics	De Broglie hypothesis of matter waves; properties of matter waves; wave packet, phase velocity and group velocity; Wave function; Physical interpretation of wave function; Heisenberg uncertainty principle; nonexistence of electron in nucleus; Schrodinger's time dependent wave equation; time independent wave equation; Particle trapped in one dimensional infinite potential well.	6
06	Physics of Sensors	Resistive sensors: Temperature measurement: PT100 construction, calibration, Piezoelectric transducers: Concept of piezoelectricity, use of piezoelectric transducer as ultrasonic generator and application of ultrasonic transducer for distance measurement. Optical sensor: Photodiode, construction and use of photodiode as ambient light measurement and flux	4
Total			**30**

Suggested Online Courses:

1. Exploring Quantum Physics Offered by University of Maryland, College Park
   https://www.coursera.org/learn/quantum-physics
2. Physics of silicon solar cells Offered by École Polytechnique.
   https://www.coursera.org/learn/physics-silicon-solar-cells
3. Semiconductor Physics Offered by University of Colorado Boulder
   https://www.coursera.org/learn/semiconductor-physics

Text Books:

1. S. Chand Avadhanulu & Kshirsagar- A textbook of Engineering Physics-
2. Dhanpat Rai Publications-Gaur and Gupta ,A textbook of Engineering Physics,

Reference Books:

1. B. G. Streetman, Prentice Hall Publisher- Solid State Electronic Devices-
2. S.Chand – Vasudeva-Modern Engineering Physics
3. S. Chand. Brij Lal and Subramaniam- Optics
4. Tata McGraw Hill - Arther Beiser -Concepts of Modern Physics.
5. New Age International Publishers- S. O. Pillai.-A Textbook of Engineering Physics.
6. R Shankar -Principles of Quantum Mechanics
7. S.M. Sze -Physics of Semiconductor Devices

Course Name: Physics Lab

Course Code: BS14P

NEP Vertical _Basket: Basic Science

Preamble:

Most of the engineering branches are being offspring of basic sciences where physics plays a pivotal role in concept and understanding the foundation of core engineering branches. Physics prepares students to apply physics to tackle 21st century engineering challenges, and to apply engineering to address 21st century questions in physics.

Course Objectives:

- The course will develop the student awareness in semiconductor devices and quantum Physics
- The student will develop an informed appreciation of the paradigm shift already in evidence in technologies behind modern services and products.
- He will possess basic physics knowledge to pursue simulation and modelling of semiconductor systems.

Pre-requisites:

Nil

Course Outcome:

The students will be able to:
CO1: Understand the measurement techniques and usage of instruments in physics
CO2: Demonstrate competency and understanding of the basic concepts found in experimental Physics.
CO3: Construct and analyze the electronic circuits and computer programs
CO4: Estimate the error in measurements and the ability to prepare a valid laboratory record

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Experiments

1. Half Wave Rectifier
2. Full Wave Rectifier
3. Electric Motor
4. Transformer
5. Transistor as a switch
6. Transistor in CB and CE mode
7. Energy Band of a Semiconductor
8. Hall Effect
9. Light Emitting Diode
10. Solar Cell
11. Zener Diode
12. PN-junction diode
13. Wavelength of LASER using grating
14. Divergence of LASER beam
15. Grove depth of CD using LASER

Guidelines to conduct practical sessions:

1. The Laboratory work is to be conducted by a group of three-five students.
2. To encourage project-based learning in the curriculum students may either select one of the mini project topics from the list given or a topic of their choice after a review process by the subject faculty.
3. Each group along with subject faculty shall identify a potential area of mini project selected, on which the study can be conducted. They can perform the real or virtual experiments related to the topic selected in the laboratory along with regular experiments.
4. Students should prepare working model, power point presentation, posters etc. on the selected topics.
5. Project assessment will be done at the end of the semester.

Suggested List of Mini Projects/PBL (to name few):

1. Electric motor
2. Astable Multivibrator
3. Mini washing machine
4. Half wave and Full wave rectifier.
5. Build an electric Transformer.
6. Making Hologram
7. Zener diode as a voltage regulator
8. Cell phone charger using solar cell

Recommended Online Courses:

https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1
https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1
https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1
https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html
https://virtuallabs.merlot.org/vl_physics.html
https://phet.colorado.edu
https://www.myphysicslab.com

Reference Books / Articles

1. Applied Physics Lab Manual by Anoop Sing Yadav

Course Name: Computer Organization and Architecture

Course Code: ES10

NEP Vertical _Basket: Engineering Science

Preamble:

This course introduces basic concepts of digital computer. It covers arithmetic operations in digital system, various types of control signal generation methods and emphasizes on memory designing of computer system. This course also introduces pipelining concept and different ways to improve performance of the system using pipeling.

Pre-requisites:

1. ES07T (Fundamentals of Logic Circuits)

Course Objectives:

- To have the rough understanding of the basic structure and operation of basic digital circuits and digital computer.
- To discuss in detail arithmetic operations in digital system.
- To discuss generation of control signals and different ways of communication with I/O devices.
- To study the hierarchical memory and principles of advanced computing.

Course Outcomes:

Learner will be able to:
CO1: To learn basic structure of computer system.
CO2: To demonstrate the arithmetic algorithms.
CO3: To understand processor organization.
CO4: To understand the generation of control signals of computer.
CO5: To demonstrate the memory organization.
CO6: To describe the concepts of parallel processing for performance improvement of processor.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
3	-	3	-

Assessment Guidelines:

Head of Learning	**ISA**	**MSE**	**ESE**	**Total**
Theory	20	30	50	100

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
1	Overview of Computer systems	Overview of computer organization and architecture, Basic Organization of Computer and Block Level functional Units, Von- Neumann Model	4
2	Data Representation and Arithmetic Algorithms	Data representation: Fixed point and floating-point representation IEEE-754 Floating point Representation Arithmetic algorithms: Implementation of ripple carry adder, LAC adder, n-bit adder-subtractor .Booths Algorithm for signed multiplication, Restoring division algorithm, Non-Restoring division algorithm. Implementation of fixed point ALU. Floating point addition and subtraction, Floating point arithmetic unit.	7
3	Processor Organization and Architecture	Typical CPU Register Organization, Instruction Cycle, instruction sequencing, Instruction Formats, instruction addressing modes, , instruction Interpretation.	6
4	Control Unit Design	Control unit implementation approaches and their comparative analysis. Hardwired Control Unit: State Table Method, Delay Element Methods, sequence counter method, Microprogrammed Control Unit: wilkies design, Micro Instruction-Formats, Hoizontal and vertical microinstruction, RISC Vs CISC, Examples of microprograms	8
5	Memory Organization	Introduction and characteristics of memory, Types of RAM and ROM, Memory Hierarchy, 2-level Memory Characteristic, Memory module designing. High speed memories: Interleaved memory, Cache Memory: Concept, locality of reference, cache mapping techniques, Cache coherence and write policies. Associative Memory.	10
6	Principles of Advanced Processor	Basics of Pipelining. Instruction Pipelining (4,5,6 stage) and Data path pipelining. Pipelining hazards, Pipelining performance measures. Flynn's Classification of parallel computer.	10
Total			**45**

Text Books:

1. William Stalling, "Computer Organization and Architecture: Designing and Performance", Pearson Publication 10TH Edition.
2. John P Hayes, "Computer Architecture and Organization", McGraw-Hill Publication, 3RD Edition.
3. Dr. M. Usha and T. S. Shrikanth, "Computer system Architecture and Organization", Wiley publication.

Reference Books:

1. Andrew S. Tanenbaum, "Structured Computer Organization", Pearson Publication.
2. B. Govindarajalu, "Computer Architecture and Organization", McGraw-Hill Publication.
3. Malvino, "Digital computer Electronics", McGraw-Hill Publication, 3rdEdition.
4. Smruti Ranjan Sarangi, "Computer Organization and Architecture", McGraw-Hill Publication.

Course Name: Data Structure

Course Code: CE01T

NEP Vertical _Basket: PC_PCC

Preamble:
Data Structures deals with the organization, management, and manipulation of data. This course covers basic data structures and their algorithms, design and analysis principles, and real-world applications. By the end, students will be able to apply their knowledge to solve complex problems.

Pre-requisites:

1. ES04T (Structured Programming) / ES05T (Object Oriented Programming)

Course Objectives:

- To understand the need and significance of Data structures as a computer Professional.
- To teach concept and implementation of linear and Nonlinear data structures.
- To analyze various data structures and select the appropriate one to solve a specific real-world problem.
- To introduce various techniques for representation of the data in the real world.
- To teach various hashing techniques.

Course Outcomes:

Learner will be able to:
CO1: Define different types of data structures and operations.
CO2: Implement linear data structure like stack or queue with operations.
CO3: Analyze the different types of linked lists like singly, doubly, and circular with operations.
CO4: Create and manipulate different types of trees with their properties and operations.
CO5: Create and represent graphs, including vertices, edges, adjacency matrix/ list, and traversal algorithms.
CO6: Apply different hashing techniques to efficiently retrieve and manipulate data.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment Guidelines:

Head of Learning	**ISA**	**MSE**	**ESE**	**Total**
Theory	15	20	40	075

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
1	Introduction to Data Structures	Introduction to Data Structures, Concept of ADT, Types of Data Structures-Linear and Nonlinear, Operations on Data Structures.	2
2	Stack and Queue	Introduction, ADT of Stack, Operations on Stack, Array Implementation of Stack, Applications of Stack-Correctness of Parenthesis, Infix to Postfix Conversion and Postfix Evaluation, Recursion. Introduction, ADT of Queue, Operations on Queue, Array Implementation of Queue, Types of Queue-Circular Queue, Priority Queue, Double Ended Queue	7
3	Linked List	Introduction, Representation of Linked List, Linked List v/s Array, Types of Linked List - Singly Linked List, Circular Linked List, Doubly Linked List, Operations on Singly Linked List and Doubly Linked List, Stack and Queue using Singly Linked List	7
4	Trees	Introduction, Tree Terminologies, Binary Tree, Types of Binary Tree, Binary Tree Traversals, Binary Search Tree, Operations on Binary Search Tree, Applications of Binary Tree-Expression Tree, Huffman Encoding, Search Trees-AVL, rotations in AVL Tree, Introduction of B Tree, B+ Tree.	7
5	Graphs	Introduction, Graph Terminologies, Representation of Graph, Graph Traversals-Depth First Search (DFS) and Breadth First Search (BFS), MST using Kruskals and Prims Algorithm	5
6	Hashing	Hashing, Hash Functions, Collision resolution Techniques	2
Total			**30**

Text Books:

1. Reema Thereja," Data Structures using C", 2nd edition, Oxford Press, 2014
2. Aaron M Tenenbaum, Yedidyah Langsam, Moshe J Augenstein, "Data Structures Using C", First Edition, Pearson Publication, 2019

Reference Books:

1. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", 2ndEdition, CENGAGE Learning, 2004.
2. P.S. Deshpande, O.G. Kakde, "C and Data Structures", First Edition, Dreamtech Press, 2003
3. E. Balagurusamy, "Data Structure Using C", First Edition, Tata McGraw-Hill Education India, 2013

Course Name: Data Structure Lab

Course Code: CE01P

NEP Vertical _Basket: PC_PCC

Preamble:

The subject explores the fundamental concepts and practical applications of organizing and manipulating data efficiently. Through hands-on experiments and problem-solving, it aims to develop students' skills in implementing and analyzing various data structures.

Pre-requisites:

1. ES04P (Structured Programming Lab) / ES05P (Object Oriented Programming Lab)

Course Objectives:

- To implement basic data structures such as arrays, linked lists, stacks and queues
- Solve problem involving graphs, and trees.
- To develop application using data structure algorithms

Course Outcomes:

Learner will be able to:
CO1: Implement Stack and be able to handle operations like insertion, deletion and traversing on them.
CO2: Implement different types of queues and be able to handle operations like insertion, deletion and traversing on them
CO3: Implement different types of linked list like Singly linked list, Circular linked list and Doubly linked list
CO4: Create and manipulate binary search tree with their properties and operations.
CO5: Implement graph traversal techniques such as DFS and BFS

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	**ISA**	**MSE**	**ESE**	**Total**
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Practicals:

Learners are expected to perform minimum 12 practical based on the following suggested topics.

Sr. No.	Suggested Topic(s)	Number of Practicals
1	Implementation of stack using array	1
2	Stack Applications (Correctness of parenthesis, Infix to postfix conversion and Evaluation of postfix expression)	3
3	Implementation of different types of queues using array (Linear queue, Circular queue, Priority queue, Double Ended queue)	4
4	Implementation of different types of linked list (Singly linked list, Doubly linked list and Circular linked list)	3
5	Implementation of stack and queue using linked list	2
6	Implementation of binary search tree	1
7	Implementation of graph traversal techniques (DFS and BFS)	2

Textbooks:

1. Reema Thereja," Data Structures using C", 2nd edition, Oxford Press, 2014
2. Aaron M Tenenbaum, Yedidyah Langsam, Moshe J Augenstein, "Data Structures Using C", First Edition, Pearson Publication, 2019

Reference Books:

1. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", 2ndEdition, CENGAGE Learning, 2004.
2. P.S. Deshpande, O.G. Kakde, "C and Data Structures", First Edition, Dreamtech Press, 2003
3. E. Balagurusamy, "Data Structure Using C", First Edition, Tata McGraw-Hill Education India, 2013

Course Name: Object Oriented Programming

Course Code: ES05T

NEP Vertical _Basket: SC_VSEC

Preamble:

The course aims to advance learner's knowledge in problem solving and programming principles for real world applications through object-oriented programming using Java language. The course emphasizes data abstraction and object-oriented programming design through the implementation of classes, objects and related concept like Inheritance, Polymorphism, Exception Handling, Multithreading and Applets.

Pre-requisites:

Structured Programming (ES04T)

Course Objectives:

- The course aims to provide exposure to problem solving through object oriented programming
- It aims to train the students the basic concepts of Java programming language
- The course involves lab component to give students hands on experience with the OOP concepts
- It aims to provide exposure to web based application

Course Outcomes:

Learner will be able to:
CO1: Apply fundamental Programming Constructs.
CO2: Illustrate the concept of packages, classes, and objects.
CO3: Elaborate the concept of strings, arrays, and vectors.
CO4: Implement the concept of inheritance and interfaces.
CO5: Implement the notion of exception handling and multithreading.
CO6: Develop simple web based applications.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module no.	Module Name	Content	No of Hours
1	Introduction to Java	Features of Java, Platform Independence – Byte Code, JVM, JRE. Data Types, Operators, Control Structures, Static Data, Static Function, 1D Array and 2D Array	4
2	Object Oriented Programming	Classes and Objects, Instance Variables, Constructors, Object Passing Methods, Method Overloading, Array of Objects	4
3	Inheritance	Concept and Types, Constructors in Inheritance, Method Overriding and Dynamic Method Dispatch, abstract and final keyword, Interfaces – Concept and Significance, Wrapper Classes – String, StringBuffer, Vector	7
4	Exception Handling	Concept of Exception, Types –Checked and Unchecked, Use of throws keyword., try-catch-finally keywords., Throwing Exception manually, User Defined Exceptions	5
5	Multithreaded Programming	Creating Thread – Different Methods, Using Thread Methods, Thread Exceptions, Priorities, Life Cycle of Thread Synchronization	5
6	Packages and Applets	Inbuilt Package, Importing Packages, User Defined Packages, Naming Packages, Advantages of Packages, Applet Basics, Applet Life Cycle, Applet Drawing Methods	5
Total			**30**

Text Books:

1. Herbert Schildt, "JAVA: The Complete Reference", Oracle Press
2. Sachin Malhotra and Saurabh Chaudhary, "Programming in JAVA", Oxford University Press

Reference Books:

1. Ivor Horton, "Beginning JAVA", Wiley, India
2. Dietal and Dietal, "Java: How to program", Prentice Hall
3. Stevan Jolzner, "JAVA Programming- Black Book", Dreamtech Press
4. ScriptDemics, "Learn to Master Java Programming", Staredu Solutions.

Course Name: Object Oriented Programming Lab

Course Code: ES05P

NEP Vertical _Basket: SC_VSEC

Preamble:

The course aims to advance learner's knowledge in problem solving and programming principles for real world applications through object-oriented programming using Java language. The course emphasizes data abstraction and object-oriented programming design through the implementation of classes, objects and related concepts like Inheritance, Polymorphism, Exception Handling, Multithreading and Applets.

Pre-requisites:

Structured Programming Lab (ES04P)

Course Objectives:

- Impart hands on experience with java programming using JDK
- Introduce programming platform like Eclipse, NetBeans, Visual Studio
- Train the students to write programs for solving real world problems using object oriented methodology
- Train the students to write web applications using applets in Java

Course Outcomes:

Learner will be able to:
CO1: Develop procedure oriented java applications using basic Programming Constructs and i/o.
CO2: Design java applications using class and objects
CO3: Demonstrate the use of predefined classes like String, Math, Scanner, Vector etc.
CO4: Develop java application to implement the concept of inheritance and interfaces.
CO5: Demonstrate the need and use of exception handling and multithreading.
CO6: Develop simple web-based applications using applets.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Practicals:

Sr.no.	Suggested Topic(s)	No. of experiments
1	Programs on Basic programming constructs like branching and looping	2
2	Program on accepting input through keyboard	2
3	Programs on class and objects	2
4	Program on method and constructor overloading.	2
5	Program on Packages	1
6	Program on String class	2
7	Program on String Buffer and Vectors.	2
8	Program on types of Inheritance.	1
9	Program on Multiple Inheritance. (interface)	1
10	Program on abstract class and abstract methods.	1
11	Program using super and final keyword.	1
12	Program on Exception handling.	2
13	Program on user defined exception.	1
14	Program on Multithreading.	2
15	Program on Graphics class.	1
16	Program on applet class.	1

Suggested List of Assignments:

1. Assignment on class and objects
2. Assignment on inheritance
3. Assignment on exception handling
4. Assignment on multithreading
5. Assignment on applets

Suggested List of Value-Added Home Assignments:

Practicing problem solving using Java on online coding challenge platforms like HackerRank, TopCoder

Suggested Online Courses:

1. Online course on Coursera : https://www.coursera.org/specializations/object-oriented-programming
2. Online course on Edx : https://www.edx.org/course/introduction-to-java-programming-starting-to- code?index=product&queryID=f7e6c0dd8a60ec2ad5fd69f3649948cb&position= 1&v= 2&linked_from=autocomplete&c=autocomplete

Text Books:

1. Herbert Schildt, "JAVA: The Complete Reference", Oracle Press

2. Sachin Malhotra and Saurabh Chaudhary, “Programming in JAVA”, Oxford University Press

Reference Books:

1. Ivor Horton, “Beginning JAVA”, Wiley, India
2. Dietal and Dietal, “Java: How to program”, Prentice Hall
3. Stevan Jolzner, “JAVA Programming- Black Book”, Dreamtech Press
4. ScriptDemics, “Learn to Master Java Programming”, Staredu Solutions.

Detailed Syllabus of Elective Courses

Course Name: Effective Communication

Course Code: HS01T

NEP Vertical _Basket: HSSM_AEC

Preamble:

This course introduces learners to the basics of Communication Skills and English Language usage which will equip them with the requisite skillset for higher studies and placements. It considers the important foundational aspects of Professional Communication and English Proficiency. It acquaints the learners with modern communication tools and the basics of public speaking before an audience.

Pre-requisites:

Nil

Course Objectives:

- To enable learners to gain understanding of the cyclic process, methods, channels, and barriers of communication.
- To facilitate learners in developing the skills of active listening, impactful public speaking, reading strategies, and effective writing.
- To create awareness of strengthening English proficiency for competitive exam preparation and the art of comprehension and summarization.
- To introduce strategies for creating effective presentations using modern ICT enabled tools.

Course Outcomes:

Learner will be able to:

CO1: Use verbal/non-verbal cues at social and workplace situations by learning the basics of communication skills.

CO2: Employ listening strategies to become effective listeners and powerful speakers for speaking at social, academic and business situations.

CO3: Improved verbal aptitude to be equipped for competitive examinations and placements.

CO4: Make effective presentations and present before an audience with confidence.

CO5: Use reading strategies for faster comprehension, summarization and evaluation of texts.

CO6: Develop awareness of contemporary digital tools of communication.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
1	Fundamentals of Communication	Concept, Elements and Cycle of Communication, Methods of Communication (Verbal and Nonverbal), Objectives and Channels of Communication (Formal and Informal), Barriers to Communication: Physical, Mechanical, Psychological, Semantic, Socio-cultural, Cross-cultural	10
2	Listening & Speaking	Techniques to improve Listening, Listening-exercises, Speech writing and delivery , Different types of Speeches & Tips on Public Speaking	6
3	English Usage	Vocabulary Building (Etymology, Synonyms, Antonyms, One Word Substitutes) useful for TOEFL, GRE, Grammar Proficiency Tests (Articles, Prepositions, Tenses, Punctuation), Identifying Common Errors in Writing, Grammar Checkers and Sentence Correction Tools	4
4	Presentation Skills	Introduction to Presentation Skills, Creating Presentations-Content, Delivering Presentations before an audience, Using Presentation Software-Modern Presentation Tools	4
5	Comprehension & Summarization	Comprehension & Reading Strategies, Graphic Organizers (Mind Maps, Flow Charts, Tree Diagrams etc.), Summarization of technical passages within specified word limit	2
6	Communication Strategies for Virtual Age	Digital Content Creation, Infographics, ICT Tools, Social and Popular Media	4
Total			**30**

Suggested List of Assignments:

1. Written Assignment on Fundamentals of Communication (Individual)
2. Listening Activities and Exercises (Individual)
3. Aptitude test on Vocabulary and Grammar (Language Lab) (Individual)
4. Presentation on domain related topics (Group)
5. Comprehension & Summarization of technical passages
6. Digital Content Creation using ICT Tools

Suggested List of Value-Added Home Assignments:

1. https://www.udemy.com/course/professional-communication-and-business-writing**/** Udemy
2. https://www.udemy.com/courses/business/communications/ Udemy

Suggested Online Courses:

1. Courses on Communication offered by Udemy
2. Business English for Non-Native Speakers Offered by The Hong Kong University of Science and Technology
   https://www.coursera.org/Specializations/Business English for Non-Native Speakers
3. English Communication Skills offered by University of Washington
   https://www.coursera.org/specializations/Business English Communication Skill
4. https://www.udemy.com/share/101wx6/Public Relations: Media Communication Crisis
5. https://www.udemy.com/share/101BkA/Basic English Grammar and Structures

Reference Books:

1. Raman Meenakshi and Sangeeta Raman, "Communication Skills", OUP, 2016.
2. Kumar Sanjay and Pushp Lata, "Communication Skills", OUP, 2011.
3. Murphy Herta, "Effective Business Communication", McGraw Hill, 2017.
4. Kitty O Locker, "Business Communication- Building Critical Skills", McGraw Hill, 2013.
5. Lehman, Dufrene, Sinha, "BCOM" Cengage Learning, 2020.
6. K. Alex, "Soft Skills", S.Chand and Company, 2014.
7. Stanton Nicky, "Mastering Communication", Palgrave Master Series, 2009.
8. Alan Pease, "Body Language", Manjul Publications, 2014.
9. A. Kaul, "Effective Business Communication", Prentice Hall of India, 2015.
10. Monippally, "Business Communication Strategies", Tata McGraw Hill, 2001.

Course Name: Effective Communication Lab

Course Code: HS01P

NEP Vertical _Basket: HSSM_AEC

Preamble:

This course introduces learners to the basics of Communication Skills and English Language usage which will equip them with the requisite skillset for higher studies and placements. It considers the important foundational aspects of Professional Communication and English Proficiency. It acquaints the learners with modern communication tools and the basics of public speaking before an audience.

Pre-requisites:

Nil

Course Objectives:

- To equip learners with Active listening with focus on content, purpose, main idea, tone and pronunciation.
- To enable learners, develop Fluent speaking in different contexts and situations.
- To develop presentation skills in social, academic and professional situations using ICT tools.
- To facilitate faster reading skills for effective comprehension in a variety of texts.

Course Outcomes:

Learner will be able to:
CO1: Listen and comprehend all types of spoken discourse successfully.
CO2: Speak fluently and make effective professional presentations.
CO3: Read large quantities of text in a short time to comprehend, summarize and evaluate content.
CO4: Present themselves professionally in social, academic and professional situations.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested List of Practicals:

1. Ice Breakers/Introduction/Aptitude Test/English Proficiency Test
2. Extempore Speech Practice Session
3. Prepared Speech
4. Group Presentations on current and relevant topics
5. Situational Dialogue Writing and Delivery
6. Skits/Role play on Methods of Communication and Barriers of Communication
7. English Usage Practice on Grammar and Vocabulary
8. Virtual Lab

Suggested Online Courses:

1. Courses on Communication offered by Udemy
2. Business English for Non-Native Speakers Offered by The Hong Kong University of Science and Technology
3. Speak English Professionally: In Person, Online & On the Phone
   https://www.coursera.org/Specializations/Business English for Non-Native Speakers
4. https://www.coursera.org/learn/speak-english-professionally
5. Improve Communication with Genial.ly (Coursera Project)
6. https://www.udemy.com/share/101BkA/Basic English Grammar and Structures
7. Public Speaking with Canva (Coursera Project)

Reference Books:

1. Raman Meenakshi and Sangeeta Raman, “Communication Skills”, OUP, 2016.
2. Kumar Sanjay and Pushp Lata, “Communication Skills”, OUP, 2011.
3. Murphy Herta, “Effective Business Communication”, McGraw Hill, 2017.
4. Kitty O Locker, “Business Communication- Building Critical Skills”, McGraw Hill, 2013.
5. Lehman, Dufrene, Sinha, “BCOM” Cengage Learning, 2020.
6. K. Alex, “Soft Skills”, S.Chand and Company, 2014.
7. Stanton Nicky, “Mastering Communication”, Palgrave Master Series, 2009.
8. Alan Pease, “Body Language”, Manjul Publications, 2014.
9. A. Kaul, “Effective Business Communication”, Prentice Hall of India, 2015.
10. Monippally, “Business Communication Strategies”, Tata McGraw Hill, 2001.

Course Name: E-waste and Environment Management

Course Code: HS05

NEP Vertical _Basket: HSSM_EEMC

Preamble:

Environmental Education helps learners to understand how their decisions and actions affect the environment, builds knowledge and skills necessary to address complex environmental issues, as well as ways we can take action to keep our environment healthy and sustainable for the future. It encourages character building and develop positive attitudes and values.

Pre-requisites:

Nil

Course Objectives:

- To introduce the effective mechanism to regulate generation, collection, storage, transport, import, export, recycling, treatment and disposal of e-wastes and their legislative rules.
- This course will help the participants to understand why and how to manage e-waste in an environmentally sound manner and how action on e-waste could be taken in their own life, business, or organization.
- To instigate sustainable practices, green innovations, e-waste recovery and inclusive recycling business models.
- To present innovative research on technological solutions to reduce hazard by design.

Course Outcomes:

Learner will be able to:
CO1: Understand need and concept of e-waste management & recycling
CO2: To gain the knowledge of legislative rules and regulations related to E-waste management.
CO3: Recognize the tools and technologies required for e-waste recycling assessment and monitoring.
CO4: Address contemporary issues and analyse the local and global impact of computing and engineering solutions on individuals, organizations, and society
CO5: Apply the knowledge about E-waste management in routine daily life to minimize the hazards.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
1	Overview of E-waste & its management	Introduction, toxicity due to hazardous substances in e-waste and their impacts, domestic e-waste disposal, e-waste management, technologies for recovery of resource from electronic waste, guidelines for environmentally sound management of e-waste, occupational and environmental health perspectives of recycling e-waste in India.	6
2	E-Waste Recycling	Technologies for recovery of resources from electronic waste, resource recovery potential of e-waste, steps in recycling and recovery of materials-mechanical processing, technologies for recovery of materials. Recovery of materials from e-waste, recovery of metals from e-waste	5
3	Exposure pathway of pollutants emitted from Recycling of E-Waste	Environmental and public health issues E-waste health risk assessment	4
4	E-Waste Management Rules of India (2011 and 2016 Rules)	Regulations in India - Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008, E-waste (Management and Handling) Rules, 2011; and E-Waste (Management) Rules, 2016 - Salient Features and its likely implication. Government assistance for TSDFs. E-waste Management: Case Studies and Unique Initiatives from around the World The international legislation: The Basel Convention; The Bamako Convention. The Rotterdam Convention. Waste Electrical and Electronic Equipment (WEEE) Directive in the European Union, Restrictions of Hazardous Substances (RoHS) Directive	6
5	Technological Advances to overcome Environmental problems	Concept of Green Buildings, Various indoor air pollutants and their effects on health. Carbon Credit: Introduction and general concept. Disaster Management: Techniques of Disaster Management to cope up with (i) Earthquake and (ii) Flood.	4

Module No.	Module Name	Content	No. of Hours
		Remote sensing and GIS – Introduction and its applications in environment sector	
6	Environmental Assessment and Management	Environment Impact Assessment (EIA), Introduction to various symbols, Environmental audit and Eco-labelling, ISO - 14001, 18001 and 31001 Pollution Control Legislation- Functions and powers of Central and State Pollution Control Board. Environmental Clearance, Consent and Authorization Mechanism.	5
Total			**30**

Suggested Online Courses:

1. Beyond Sustainable Development Goals (SDGs): Addressing Sustainability and Development, offered by University of Michigan - https://www.coursera.org/learn/beyond-the-sustainable-development-goals-addressing-sustainability-and-development
2. Environmental Management & Ethics offered by Technical University of Denmark (DTU) - https://www.coursera.org/learn/environmental-management-ethics
3. Introduction to Sustainability offered by University of Illinois at Urbana-Champaign- https://www.coursera.org/learn/sustainability

Text Books:

1. G. Tyler Miller Jr. and Scott Spoolman, "Environmental Science", 13th Edition, Brooks/Cole, 2011

Reference Books:

1. Keerthinarayana and Daniel Yesudian, "Environmental Science and Engineering", 1st Edition, Hi-Tech Publications, 2008
2. G.M. Masters, "Introduction to Environmental Engineering and Science", Pearson Education Pvt Ltd., 2005
3. Anubha Kaushik and C.P. Kaushik, "Environmental Science and Engineering, 3rd Edition, New Age International, 2010
4. Boyle G., "Renewable Energy: Power for a Sustainable Future", Oxford publication, UK 3rd edition, 2012
5. Erach Bharucha, "Text Book of Environmental Studies", Universities Press (India) Pvt. Ltd., 2005
6. Johri R., "E-waste: implications, regulations, and management in India and current global best practices", TERI Press, New Delhi.
7. Krishnamoorthy B., "Environmental Management, Text Book and Cases", PHI Learning (P) Ltd., New Delhi.
8. Electronic Waste Management Rules 2016, Govt. of India, available online at CPCB website.
9. MSW Management Rules 2016, Govt. of India, available online at CPCB website.
10. Hester R.E., and Harrison R.M., "Electronic Waste Management", Science, 2009.
11. Fowler B., "Electronic Waste" – 1st Edition (Toxicology and Public Health Issues), Elsevier, 2017

Course Name: Professional Skills

Course Code: HS02T

NEP Vertical _Basket: HSSM_VEC

Preamble:

The course will groom learners in the areas of developing professional etiquettes, building digital profiles, imbibing workplace ethics, and organizational behavior. This course will also be an essential guide in building business communication and soft skills concepts.

Pre-requisites:

Nil

Course Objectives:

- To introduce the concepts of the job application process and digital profile building.
- To create awareness of professional etiquettes and corporate culture in tune with 21st Century soft skills.
- To enable learners to enrich their personality through self-awareness and SWOT analysis and understand various interpersonal skills required for the workplace.
- To build the foundations of professional ethics and corporate social responsibility among learners.

Course Outcomes:

Learner will be able to:

CO1: Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume.

CO2: Acquire basic proficiency in building a digital profile by demonstrating an awareness of professional and ethical responsibilities.

CO3: Understand the nuances of professional etiquettes and professionalism.

CO4: Enrich their personality through SWOT analysis, identify their personality traits and learning styles

CO5: Develop interpersonal skills to build effective professional relations.

CO6: Demonstrate awareness of contemporary issues, knowledge of ethical responsibilities and CSR.

Course Scheme:

Contact Hours		**Credits Assigned**	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	15	20	40	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module name	Content	No. of Hours
1	Employment Skills	Job Application & Resume Writing, Group Discussion, Interview Skills, Digital Profile Building (ePortfolio, LinkedIn)	10
2	Professional Etiquettes	Corporate Grooming and Workplace Etiquette, Telephone Etiquette, Netiquettes, Telephone Etiquette, Digital Footprints, Social Media, Personal Profile Privacy	4
3	Interpersonal Skills	Assertiveness, Negotiation, Leadership, Team Building, Problem Solving, Decision Making, Cultural and Emotional Intelligence	6
4	Ethics	Introduction to Ethics, Plagiarism and Online, Plagiarism Checker, Patents, Trademark and Copyrights and GI – Geographical Indicators, Professional Ethics, Corporate Social Responsibility (CSR) –Information Confidentiality	4
5	Personality Enrichment	SWOT Analysis and JOHARI window, Developing Positive Attitude, Personality Types and Learning Styles, Vision and Goal Setting, Stress Management and Time Management	4
6	21st Century Skills	Creative Thinking, Critical Thinking, Collaboration and Communication	2
Total			**30**

Suggested List of Assignments:

1. Draft a Cover Letter and a Resume in response to a job vacancy advertisement (Individual)
2. Role plays and documentation on Professional Etiquettes (Group)
3. Role Play and documentation on Interpersonal Skills (Group)
4. Analysis of case studies on Ethics (Individual)

5. SWOT Analysis (Individual)
6. Assignment on 21st Century Skills (Group)

Suggested Online Courses:

1. LinkedIn Mastery: Creating an awesome profile – https://www.udemy.com/course/linkedin-mastery-creating-an-awesome-profile/
2. Soft Skills: The 11 Essential Career Soft Skills – https://www.udemy.com/course/soft-skills-the-11-essential-career-soft-skills/
3. Understanding Personality Types at Work – https://www.udemy.com/course/understanding-personality-types-at-work/
4. Speak English Professionally: In Person, Online & On the Phone - https://www.coursera.org/learn/speak-english-professionally
5. How to Write a Resume (Project Centered Course) https://www.coursera.org/learn/how-to-write-a-resume
6. Interviewing and Resume Writing in English Specialization https://www.coursera.org/specializations/english-interview-resume
7. Build Your Professional ePortfolio in English – https://www.coursera.org/learn/eportfolio-english

Reference Books:

1. Wallace and Masters, "Personal Development for Life and Work", Thomson Learning, 2021.
2. Dr. K.Alex, "Soft Skills", S. Chand and company, 2014.
3. Robbins Stephens, "Organizational Behaviour", Pearson Education, 2016.
4. Dorch, Patricia, "What Are Soft Skills?", Executive Dress Publisher, NewYork, 2013.
5. Francis Peter, "Soft Skills and Professional Communication", Tata McGraw Hill, 2019.
6. Kitty O Locker, "Business Communication- Building Critical Skills", McGraw Hill, Sixth Edition.
7. Chaturvedi and Chaturdevi, "Business Communication - Concepts Cases and Applications", Pearson, 2021.
8. Jones, "How to Speak Fluently", Indian Publishing House, 2021.

Course Name: Professional Skills Lab

Course Code: HS02P

NEP Vertical _Basket: HSSM_VEC

Preamble:

The course, Professional Skills for the Workplace, will groom students in the areas of developing professional etiquettes, building digital profiles, imbibing workplace ethics, and organizational behaviour. This course will also be an essential guide in building business communication and soft skills concepts.

Pre-requisites:

Nil

Course Objectives:

Student will be able to:

- Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews, and writing resume.
- Acquire basic proficiency in building a digital profile on LinkedIn, etc. and demonstrate an awareness of professional etiquettes through role play.
- Develop interpersonal skills to build effective professional relations by participating in seminars and quizzes.
- Demonstrate awareness of contemporary issues, knowledge of ethical responsibilities and CSR through case studies.
- Enrich their personality through SWOT analysis, identify their personality traits and learning styles through diagnostic tests.
- Demonstrate awareness of 21st century skills through poster presentation and discussions.

Course Outcome:

Student will be able to:
CO1: Observe and participate in Group Discussions and Mock Interviews on the lines of campus placement training.
CO2: Build a digital profile by demonstrating awareness of a professional persona.
CO3: Identify various interpersonal skills through participation in presentations and role play.
CO4: Differentiate between ethical and non-ethical behaviour through analysis of case studies.
CO5: Identify their personality traits and learning styles through activities like SWOT analysis.
CO6: Demonstrate awareness of 4 C's relevant to 21st Century Skills.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	2	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	050

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Suggested list of Practicals:

1. Icebreakers – Introducing others
2. GD Practice Session 01
3. GD Practice Session 02
4. Final GD – ISA
5. Mock Interviews
6. Digital Profiling/ E-portfolio
7. Role Play on Professional Etiquettes
8. Quizzes on interpersonal skills
9. Case Studies on Ethics
10. Personality Enrichment – SWOT Analysis, JOHARI Window
11. Personality Enrichment - Identifying self-learning styles, MBTI test
12. Poster Presentation/Other activities on 21st Century Skills

Course Name: Design Thinking

Course Code: GECI01

NEP Vertical _Basket: HSSM_EEMC

Preamble:

Design thinking is a powerful tool for rethinking and revitalizing strategy—and for driving organizational performance. By placing customers' needs at the center of a product, service, process, or business model, you can reframe strategic challenges and develop more effective solutions. Drawing on right-brained creativity and left-brained analytics, the course on design thinking enables you to broaden your strategic perspective, find novel opportunities for innovation, and keep your business moving forward.

Course Objectives:

- To impart knowledge on the concepts of Design Thinking
- To impart knowledge on the phases of Design Thinking
- To apply Design Thinking concepts

Course Outcomes:

Learner will be able to:
CO1: Understand the concepts of design thinking approaches
CO2: Create design thinking teams and conduct design thinking sessions
CO3: Apply both critical thinking and design thinking in parallel to solve problems
CO4: Apply design concept to their daily work

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Tutorial	Theory	Tutorial
2	1	2	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory & Tutorial	50	-	50	100

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Design Thinking Overview	What is different about design thinking, Design thinking skills, Design thinking mindset, Principles of Design thinking
2	General Approaches to Design Thinking	The basics of Design thinking, Design thinking frameworks, Design thinking team, Design thinking workshops and meeting – Characteristics and types
3	Design Thinking approach in stages	Apply design thinking framework, empathize with customers/users, Define the problem, Ideate, Prototype, Test solution.
4	Design Thinking Techniques	Listening and emphasizing techniques – Engagement, Observation, showing empathy, Define and ideation techniques – Unpacking, Personas, Pattern recognition and connecting the dots, Prototype, and testing techniques – Types of prototypes, forms of testing in design thinking,
5	General Design Thinking Practices	Use of diagrams and maps in design thinking – empathy map, affinity diagram, mind map, journey map. Story telling techniques – Improvisation, scenarios, K-scripts
6	Adopt and Adapt Design thinking	Cautions and pitfalls – assumptions, pitfalls and cautions in design thinking workgroups, Best practices

Reference Books:

1. Tim Brown, "Change by Design - How Design Thinking Transforms Organisations and Inspires Innovations"
2. Larry J.Leifer, Michael Lewerick, and Patrick, "The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods"

Course Name: Indian Constitution

Course Code: GEPS01

NEP Vertical _Basket: HSSM_IKS

Preamble:

This course introduces learners to the framework that demarcates fundamental political code, structure, procedures, powers, and duties of government institutions and sets out fundamental rights, directive principles, and the duties of citizens.

Pre-requisites:

NIL

Course Objectives:

- To understand what a constitution is and why it is necessary
- To understand how the constitution, embodies certain ideals
- To understand importance of fundamental rights and fundamental duties
- To understand the functioning of the Parliament.

Course Outcomes:

Learner will be able to:
CO1: Learner will be able to understand constitution principles
CO2: Learner will be able to co-relate with political system
CO3: Learner will be able to pursue the values of civic life
CO4: Learner will be able to exercise their rights and duties

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Introduction	Historical background of constitution, Philosophy of constitution
2	Citizenship	Citizenship at the commencement of the Constitution, Rights of citizenship of certain persons of Indian origin residing outside India, Persons voluntarily acquiring citizenship of a foreign State not to be citizens, Continuance of the rights of citizenship, Fundamental Duties
3	Fundamental Rights	Definition, Laws inconsistent with or in derogation of the fundamental rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Core issues (Uniform civil code, Article 370, Reservation)
4	Directive Principles of State Policy	Definition, Certain principles of policy to be followed by the State, Equal justice and free legal aid, Organisation of village panchayat, Right to work, to education and 10 public assistance in certain cases, Provision for just and humane conditions of work and maternity relief, Living wage, etc., for workers, Participation of worker; in management of industries, Uniform civil code for the citizens, Provision for free and compulsory education for children, Promotion of educational and economic interests of Scheduled Castes, Scheduled Tribes and other weaker sections, Protection and improvement of environment and safeguarding of forests and wild life, Protection of monuments and places and objects of national importance, Separation of judiciary from executive, Promotion of international peace and security
5	The Parliament	Constitution of Parliament, Composition of the Council of States, Composition of the House of the People, Duration of Houses of Parliament, Rights of Ministers and Attorney-General as respects Houses, Law making procedure, Amendment process and language
6	Judiciary	Establishment and Constitution of Supreme Court, High Courts for States, Subordinate Courts, Working of quasi – judicial bodies
7	Elections	Superintendence, direction and control of elections to be vested in an Election Commission, Power of Parliament.to make provision with respect to elections to Legislatures, Power of Legislature of a Slate to make provision with respect to elections to such Legislature Bar to interference by Couns in electoral matters
8	Landmark cases	Nanavati case, Shah Bano, Keshvanand BhartiVishakha Case etc

Recommended Online Courses:

1. Constitutional Studies
   https://onlinecourses.nptel.ac.in/noc20_lw03/preview
2. Constitution of India
   https://www.udemy.com/course/constitution-of-india/

Reference Books:

1. D.C. Gupta, "Indian Government and Politics"
2. D.D. Basu, "Introduction to the Constitution of India"
3. P. M. Bakshi, "The Constitution of India"
4. M. V. Pylee, "Constitutional History of India"

Course Name: Universal Human Values

Course Code: GESB02

NEP Vertical _Basket: HSSM_VEC

Preamble:

The present education system has become largely skill-based. The prime emphasis is on science and technology. However, science and technology can only help to provide the means to achieve what is considered valuable in terms of facilities. Value Education is a crucial missing link in the present education system. Because of this deficiency, most of our efforts may prove to be counterproductive and serious crises at the individual, societal and environmental level are manifesting.
Values and skill complement each other. Values mean importance or participation and skills mean qualities, training, and capabilities. To fulfil our aspirations both values and skills are necessary. When we identify and set the right goals and produce in right direction, this is known as value domain, the domain of wisdom. Basically, we must know what really is useful to achieve human happiness, the happiness to all and for all the time.
And when we learn and practices to actualize this goal to develop the techniques to make this happen in real life, in various dimensions of human Endeavour, this is known as domain of skills. Hence, there is an essential bonding between values and skills for the success of any human endeavor.
For a happy and successful life, it is important to know, explore, verify and practice universal human values, professional ethics.

Prerequisite:

NIL

Course Objective:

- To help the student to see the need for developing a holistic perspective of life.
- To sensitize the student about the scope of life – individual, family, society and nature/existence.
- Strengthening self-reflection.
- To develop more confidence and commitment to understand, learn and act accordingly.

Course Outcomes:

Learner will be able to:
CO1: Learner will become more aware of themselves and their surroundings.
CO2: Learners will be more responsible in life and will able to handle critical problems.
CO3: Learners will develop better critical ability.
CO4: Learners will be more sensible towards commitment.
CO5: Learner will be able to apply human values in day to day life.
CO6: Learner will become a responsible citizen.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Introduction to Value Education	Need for Value Education Basic Guidelines for Value Education The Content of Value Education The Process of Value Education Starting to observe inside What is Self-exploration? What is its Purpose? Content of Self-exploration Process of Self-exploration Natural Acceptance What is the State today? What is the way out? What do we need to do?
2	The Basic Human Aspirations Continuous Happiness and Prosperity	Continuous Happiness and Prosperity Our Basic Aspirations Exploring Happiness and Prosperity A Look at the Prevailing Notions of Happiness and Prosperity Some Possible Questions/Confusions Basic Requirements for Fulfilment of Human Aspirations What is our State today? Why are we in this State? - Living with Wrong Assumptions What is the Solution? The Need for Right Understanding Our Program: Understand and Live in Harmony at all Levels of Living Our State today Our Natural Acceptance for Harmony at all Levels of our Living Human and Animal Consciousness

3	Understanding the Human Being as Co-existence of Self ('I') and Body	Human Being is more than just the Body Understanding Myself as Co-existence of the Self and the Body Understanding Needs of the Self and Needs of the Body Understanding the Activities in the Self and the Activities in the Body Understanding the Self (I) as the Conscious Entity, the Body as the Material Entity Exercise on distinguishing Needs of the Self ('I') and Body Exercise on Distinguishing Activities of the Self (I) and Body Understanding the Body as an Instrument of 'I' (I' being the Seer, Doer and Enjoyer) Why should I study Myself? Getting to know the Activities in the Self (I) How are the Activities in T Related! The Activities in 'I' are Continuous Effects of the Problem.... What then is the Solution? Result of Realization and Understanding Living with Definiteness Our Body A Self-organized Unit Harmony of T with the Body: Sanyama and Svasthya What is our State today? What is the way out? Understanding and Living with Sayama Correct Appraisal of our physical needs
4	Harmony in the Family, Society, Nature-Understanding Values in Human Relationships	Family as the Basic Unit of Human Interaction Harmony in the Family. Justice (Nyaya) What is the State today? Values in Human Relationships Trust (Visvasa) Respect (Sammana The Basis for Respect Assumed Bases for Respect Today The Problems due to Differentiation Difference between Attention' and 'Respect' What is the way out? Affection (Sneha) Care (Mamand) Guidance (Vatsalya) Reverence (Shraddha) Glory (Gaurava) Gratitude (Kritagayta) Love (Prema) Harmony from Family to World Family: Undivided Society

		Extending Relationship from Family to Society Identification of the Comprehensive Human Goal Where are we today? Programs Needed to Achieve the Comprehensive Human Goal: The Five Dimensions of Human Endeavour Education-Right Living (Siksha Sanskara) Health-Self-regulation (Svasthya-Sanyama) Justice-Preservation (Nyaya-Suraksha) Production-Work (Utpadana-Karya) Exchange-Storage (Vinimaya-Kosa) What is our State today? Harmony from Family Order to World Family Order: Universal Human Order The Four Orders in Nature Interconnectedness and Mutual Fulfilment (Parasparta aur Paraspara Purakata) Recyclability and Self-regulation in Nature Undertanding the Four Orders Things (Vastu) Activity (Kriya) Innateness (Dharana) Natural Characteristic (Sabha) Basic Activity Conformance Human Beings-our State today What is way out
5	Implications of the Right Understanding	Values in Different Dimensions of Human Living Universal Values naturally emerging from the Right Understanding Definitiveness of Ethical Human Conduct Identification of Snama leading to Svatantrata and Swarajya Development of Human Consciousness Implications of Value-based Living Identification of Comprehensive Human Goal Vision for the Holistic Alternative Basis for Humanistic Education and Humanistic Constitution Universal Human Order and its Implications
6	Professional Ethics Journey towards the Holistic Alternative	Profession-In the Light of Comprehensive Human Goal Ensuring Competence in Professional Ethics- The current Scenario Inherent Contradictions and Dilemmas and their Resolution Appreciating the Need for Self-Exploration Facilitating the Understanding of Harmony at various Levels Steps for Evolution at the Individual Level

		Steps for Transition at the Level of Family Society and Profession Promoting Mass Awareness and moving towards Humanistic Education Evolving Holistic Models of Living Amending Policies, Programs and Social Systems in tune with Comprehensive Human Goal Is the Transition too Difficult? Concluding Remarks

Reference Books:

1. A Foundation course in Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria Excel books.

Course Name: Indian Traditional Knowledge Systems

Course Code: GESB03

NEP Vertical _Basket: HSSM_IKS

Preamble:

India has a vast tradition of Sanskrit texts dealing with various scientific thoughts. Number of treatises on the topics like Agriculture, Animal Husbandry, Chemistry, Astronomy, Mathematics, Botany, etc. focus on the development of thoughts in the concerned area.

This course aims at introducing a student with various treatises on physical as well as social sciences and their contribution to modern branches of sciences. Taking into consideration the vast scope of these sciences, major treatises will be introduced in the course thereby making a student to ponder over the ancient knowledge systems of India.

Pre-requisites:

NIL

Course Objectives:

- The objective of this course is to facilitate the learners with the concepts of Indian traditional knowledge and to make them understand the importance of roots of knowledge system.
- It aims at imparting basic principles of thought process, reasoning and inference

Course Outcomes:

Learner will be able to:

CO1: Understand and the rich history of Indian knowledge system

CO2: Understand the different areas of contribution from India

CO3: Apply the different principals of traditional knowledge in modern systems

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module name	Content
1	Review of Scientific Literature in Sanskrit	References of sciences/scientific knowledge through different textual sources etc.
2	Chemistry and Mathematics	Various treatises on Chemistry, Use of chemistry in medicines, Metallurgy, Use of chemistry for occult practices, Mathematical concepts through Shulbasutras, Development of different mathematical branches and treatises based on that, Development of astronomy, etc.
3	Dietetics	Study of different texts based on culinary art Nalapakadarpana, Bhojanakutuhalam, Supashastra, Modes of preservation of food, Dietary guidelines through branches of Ayurveda, Food and diseases, etc.
4	Agriculture, Astronomy, and Zoology	Study of krishisuktas, Krishiparashara, Brihatsamhita, Types of crops, Manures, Types of land- devamatruka, nadimatruka, Indian Astronomy, Use of animals in warfare, Animal husbandry, Animals for medicines, etc.

Reference Books:

1. Nirmal Trikha, "Scientific Knowledge in Sanskrit Literature"
2. S. Balachandra Rao, "Indian Astronomy: An Introduction"
3. B. Seal, "Ancient Indian Sciences"
4. Melissa Stewert, "Science in Ancient India (Science of the Past)"
5. Sudheer Birodkar, "India's Contribution to World Culture"
6. R. C. Majumdar, "Ancient India"
7. Swami ChidatmanJee Maharaj, "Ancient Indian Sciences"
8. Stella Kramrisch, "The Art of India through the Ages"
9. K.Krishna Murthy, "Early Indian Secular Architecture"

Course Name: Voice Culture for Professional Speaking

Course Code: GEA01

NEP Vertical _Basket: HSSM_AEC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Voice Culture for Professional Speaking	Introduction to Voice, Do's and don'ts for voice, General Reading session, Review of reading session. Good posture exercise, Relaxing the mind exercise, Tongue stretching exercise, breathing exercise or good fuller voice. Resonance, Improving resonance, voice clarity exercise, accent. Reading session – voice projection, understanding personality – traits, emotions, body language. Nonverbal communication, Thoughts – positive, negative and their effect on voice. Listening skill and exercise. Voice modulation, pitch, volume, tone, stress, speed, rhythm. Pronunciation – The Indian accent way, Presentation skills

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Financial Management for beginners

Course Code: GEF02

NEP Vertical _Basket: HSSM_EEMC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Financial Management for beginners	Overview of Economics, macroeconomics, microeconomics, Money and its flow Overview of Share Market, Primary market, secondary market, nature of trading, scrips for short term and long-term investment Modes of Investments, Debt, equity, gold, property, assessment of investment type. Mutual Funds, Fund houses, mutual fund schemes, SIP, Magic of compounding Crypto and its future, maximum asset allocation in crypto Growing sectors from Engineering perspective

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Four Pillars of Democratic Nation

Course Code: GEPS02

NEP Vertical _Basket: HSSM_VEC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Four Pillars of Democratic Nation	The term 'Democracy', History of democracy, Indian Democracy, Responsibility of good citizen. Legislature – Six major functions of legislature Executive - President, Vice-President, Prime Minister, Cabinet Minister, Secretaries, and Civil services Judiciary – Indian Juridical system, Indian Constitution, Court structure Media - The basic right of freedom of speech and expression, Print Media and digital media

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Railways – Wonders of Infrastructure

Course Code: GEWI01

NEP Vertical _Basket: HSSM_VEC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Railways – Wonders of Infrastructure	History of civilization, Industrial revolution, early-stage steam engine, steam powered locomotives Liverpool to Manchester railways, Economic changes brought by railways. Indian Railways, Land and bridges, electrification, telecommunication, public sector undertakings, Reforms in railway sector.

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: IQ vs EQ

Course Code: GEPEW02

NEP Vertical _Basket: LLC_CC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	IQ vs EQ	Introduction to Emotional Intelligence, the ability to understand, use, and manage your own emotions in positive ways to relieve stress, communicate effectively, empathize with others, overcome challenges and defuse conflict. Applications of EQ skills for mental health and wellbeing, self-awareness, self-motivation, active listening. The EQ view and Neuroscience of emotional intelligence, Intrinsic motivation and goal setting

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Facets of Astronomy

Course Code: GENS01

NEP Vertical _Basket: LLC_CC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Facets of Astronomy	Astrophysics: applying the laws of physics in space. Astrometry: mapping celestial bodies. Astrogeology: examining rocks, terrain, and material in space. Astrobiology: Searching for life outside Earth. Use of physics, mathematics, chemistry in astronomy Types of telescopes, Refractor Telescopes. Reflector Telescopes. Dobsonian Telescopes. Maksutov-Cassegrain Telescopes. The scientific study of celestial objects visible at night, Various celestial objects to observe.

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Various dance forms

Course Code: GEA02

NEP Vertical _Basket: LLC_CC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Various dance forms	Dance, Definition, History, music, rhythm. Basic understanding of the term ABHINAYA and definition of its four aspects. Technical terminology of dance. Acquaintance with the traditional costumes. Dance forms: Indian Classical dance, folk dance, Bollywood, Jazz and performances

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Responsibility towards sustainable environment

Course Code: GESB06

NEP Vertical _Basket: HSSM_VEC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Responsibility towards sustainable environment	Sustainability, Pillars of sustainability, social equity, economic development, environmental protection, cultural/human sustainability. Sustainable development, United nation's sustainable development goals. Sustainable Environment, long term health of ecosystem, renewable resources, Global warming, protection of species diversity and ecological structure, Low carbon economy. Being responsible towards sustainable environment, dos and don'ts, Smart City – city functions, economic growth, quality of life, technology used.

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Nutrition and Physical Wellness

Course Code: GEPEW03

NEP Vertical _Basket: LLC_CC

Preamble:

This course introduces learners with an aim to focus on holistic personality development, a wide platter of General Education courses is offered to First Year Engineering students. These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to integrate knowledge, make informed ethical decisions and accept civic responsibilities

Course Outcomes:

Learner will be able to:
CO1: Demonstrate effective oral communication
CO2: Demonstrate the ability to think critically and creatively
CO3: Apply quantitative reasoning concepts and skills to solve problems
CO4: Illustrate the ability to self-reflect and access relevant ethical values

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall have the choice to decide her/his assessment methodology based on the nature of the course. Faculty may propose the revised assessment methodology for his/her course. However, the revised assessment methodology shall be approved by

a panel constituted at institute level and published to the learners before the commencement of the semester.

Detailed Syllabus:

Module No.	Module Name	Content
1	Nutrition and Physical Wellness	Nutrition, Types of nutrition, Human need, Carbohydrates, proteins, vitamins, water, fats, minerals Well-balanced diet and its advantages Physical activities, daily exercises, need of stretching in working hours, best time and duration for physical activities, risk of taking supplements, dangers of following harmful fads. Physical wellness, finding time to move your body, warning sign by body, maintaining regular sleep schedule, maintaining ideal weight.

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person/subject matter expert in session

Course Name: Wellness: Body, Mind and Spirit

Course Code: GEPEW01

Category: Liberal Learning Courses

Preamble:

Wide platter of Liberal Learning courses are offered to First Year Engineering students with an aim to focus on holistic personality development These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- The course aims to provide students with a comprehensive understanding of wellness, with a focus on mental, emotional, social, and spiritual dimensions.

Course Outcomes:

Learner will be able to:
CO1: Holistic Understanding of Wellness
CO2: Proficiency in Yogic Practices
CO3: Application of Wellness Principles

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment Guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

ISA: Quizzes

ESE: Performance

Detailed Syllabus:

Module No.	Module Name	Content
1	Introduction to Wellness	1.1 Understanding Wellness Definition and dimensions of wellness: mental, emotional, social, spiritual Importance of achieving a balanced and holistic lifestyle 1.2 Wellness Models Exploring different models of wellness (e.g., The Wheel of Wellness) Identifying factors that contribute to overall well-being 1.3 Assessing Personal Wellness Self-assessment tools for mental, emotional, and social well-being Goal-setting for wellness improvement
2	Yoga for Mind and Spirit	2.1 Introduction to Yoga History, philosophy, and different forms of yoga Yoga as a holistic approach to well-being 2.2 Yogic Asanas (Postures) Practicing basic yoga poses for mental and spiritual benefits Alignment, breathing, and mindfulness in yoga practice 2.3 Meditation and Mindfulness in Yoga Incorporating meditation and mindfulness techniques into yoga Developing mental clarity and focus through yogic practices
3	Mental and Emotional Wellness	3.1 Stress Management Recognizing sources of stress Yogic techniques for stress reduction 3.2 Emotional Intelligence Applying yogic principles to enhance emotional intelligence Cultivating compassion and self-awareness through yoga 3.3 Mindfulness and Relaxation Techniques Yoga nidra and other relaxation practices Using breathwork for emotional well-being
4	Spiritual Wellness	5.1 Exploring Spirituality through Yoga Connecting with one's inner self and values through yoga Understanding the spiritual dimensions of yoga 5.2 Practices for Spiritual Wellness Meditation, chanting, and other spiritual practices in yoga Integrating spirituality into daily life

5	Integrating Yoga into Daily Life	6.1 Creating a Personal Yoga and Wellness Plan Synthesizing knowledge from previous modules Developing a comprehensive and realistic yoga and wellness plan 6.2 Overcoming Challenges Strategies for overcoming obstacles to regular yoga practice Building resilience and maintaining a positive mindset through yoga 6.3 Lifelong Yoga and Wellness Habits Establishing habits for sustained well-being through ongoing yoga practice Continuing personal growth and development with yoga

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Course Name: Exploring Indian Arts

Course Code: GEA03

Category: Indian Knowledge System

Preamble:

Wide platter of General Education courses are offered to First Year Engineering students with an aim to focus on holistic personality development These courses will also help to create balance in brain hemispheres and thereby improve learners' clarity in thoughts and responses.

Pre-requisites:

NIL

Course Objectives:

- To develop the intellectual skills and competencies necessary to participate effectively in society and the world
- To develop broad knowledge of living and non-living world
- To develop ability to appreciate and acknowledge creativity.

Course Outcomes:

Learner will be able to:
CO1: Understand how they can contribute towards each type of art.
CO2: Work towards developing holistic personality through critical and creative thinking.
CO3: Complement technical knowledge by developing diversified perspectives on various aspects of learning.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
2	-	2	-

Assessment Guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	25	-	50	075

ISA: Quizzes

ESE: Art Form (Painting/Singing/Folk Dance)

Detailed Syllabus:

Module No.	Module Name	Content
1	Introduction to Indian Art	Indian art consists of a variety of art forms, including painting, sculpture, pottery, and textile arts such as woven silk. Geographically, it spans the entire Indian subcontinent, including what is now India, Pakistan, Bangladesh, Sri Lanka, Nepal, and at times eastern Afghanistan. A strong sense of design is characteristic of Indian art and can be observed in its modern and traditional forms. Discussing different types & forms in Indian Art. Drawing, painting, Handicraft performing Art to performing art.
2	Indian Architecture	Photos & videos of Indian structure will be shown. Students will share their views on the same. The session starts with Students will get one Topic, which they must discuss with their teammates & present in front of the class. Assignments will be on Architectural sites. They will choose their own topic & will present in limited timespan.
3	Indian Music/ Performing Art	Discussion on what is performing Art. There are 4 major streams dance, music, theater & film. As per each state how the language changes, which state is famous for what thing. How was the impact of Rulers & Kings and it was depicted in paintings & sculptors. Students will share their native experiences & will perform for their class.
4	Painting styles & Handicrafts	Warli Painting is of tribal art mostly created by the tribal people from the North Sahyadri Range in Maharashtra, India. This range encompasses cities such as Dahanu, Talasari, Jawhar, Palghar, Mokhada, and Vikramgad of Palghar district. This tribal art was originated in Maharashtra, where it is still practiced today.
5	Madhubani Painting	Madhubani Painting (also Mithila art) is a style of painting practiced in the Mithila region of India and Nepal. It is named after the Madhubani district of Bihar, India, which is where it originated. Artists create these paintings using a variety of mediums, including their own fingers, or twigs, brushes, nib-pens, and matchstick. The paint is created using natural dyes and pigments. The paintings are characterized by their eye-catching geometrical patterns. There is ritual content for particular occasions, such as birth or marriage, and festivals, such as Holi, Surya Shasti, Kali Puja, Upanayana, and Durga Puja.

Recommended Online Courses:

Nil

Reference Books:

As suggested by resource person in session

Appendix

Exit Policy under NEP 2020 for UG Certificate

As per NEP GR dated 4th July 2023 "Students exiting the First Year programme after securing minimum 40 credits will be awarded UG Certificate in the relevant Discipline /Subject provided they secure 8 credits in work-based vocational courses or internship / Apprenticeship offered during summer vacation in addition to 4 credits from skill-based courses earned during the first and second semester."

Department of Computer Engineering offers following exit degree options to UG students satisfying the above criteria i.e.

1. Must have secured minimum of 40 credits in First Year (Sem 1 and Sem 2 total credits earned).

2. For 4 credits from skill-based courses to be earned during the semester: Refer column "Mandatory Courses" in table below. Student must successfully complete the courses whose course codes are mentioned in Mandatory Courses in order to choose the corresponding UG Certificate.

3. For 8 credits in work-based vocational courses or internship/ Apprenticeship offered during the summer vacation: Refer column "Courses for Additional 8 credits" in table below. Student must complete the additional courses mentioned in order to choose the corresponding UG Certificate.

Mandatory Courses	Courses for Additional 8 credits	UG Certificate Awarded
ES04T, ES04P, ES05T, ES05P	• **Certificate Course on Python Programming (4 Credits)** • **Certificate Course on Advanced Java Programming (4 Credits)**	**Application Developer**
ES06T, ES06P ES09T, ES09P	• **Certificate Course on Hardware Assembly (4 Credits)** • **Certificate course on Networking (4 Credits)**	**Network Administrator**

Details on Certificate Courses:

1. Certificate course on Python Programming: Successful completion of courses CE08/ IT08 of VIT Autonomy R-2022 Curriculum of Computer Engineering and Information Technology respectively along with related project work of 60 hours.

2. Certificate course on Advanced Java Programming: Successful completion of courses IT02T, IT02P of VIT R-2022 Curriculum of Information Technology along with related project work of 30 hours.

3. Certificate course on Hardware Assembly:

Successful completion of a course covering Basics of Computer Hardware, Peripherals and Data Storage Devices, Computer Networking and Hardware, Working and Maintenance of Computer System along with 30 hours of Internship under Systems department of VIT.

4. Certificate course on Networking:

Successful completion of course ECL604 of EXTC Sem 6 R-2019 Scheme of UoM along with 60 hours of Internship under Systems department of VIT.