



Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

Bachelor of Technology

in

Information Technology

Second Year Scheme & Syllabus

(As per NEP 2020, with effect from the Academic Year 2024-25)

Course Structure and Assessment Guidelines
for
Bachelor of Technology
in
Information Technology

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 lifelong 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.

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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 Information Technology
Vidyalankar Institute of Technology

Chairman, Academic Council
Vidyalankar Institute of Technology

**Second Year B. Tech. Information Technology
Course Structure and Assessment Guidelines**

Preferred Semester: III

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS41	Engineering Mathematics-III	Theory	3	20	30	50	100
PC_PCC	IT04T	Microprocessor	Theory	2	15	20	40	075
	IT04P	Microprocessor Lab	Practical	1	25	-	25	050
	IT02T	Advanced Java	Theory	2	15	20	40	075
	IT02P	Advanced Java Lab	Practical	1	25	-	25	050
	IT01T	Data Structure & Analysis	Theory	2	15	20	40	075
	IT01P	Data Structure & Analysis Lab	Practical	1	25	-	25	050
CEP/FP	GESB01	Social Service Internship/ Project	Practical	2	25	-	50	100
MDM	MDXX*	Any MDM course	Theory	2	15	20	40	075
			Theory	2	As per course			075
HSSM_AEC	HS04	Presentation Skills	Practical	1	50	-	-	050
HSSM_IKS	GEXX*	Any HSSM_IKS course	As per course	2	As per course			
Total Credits				19				

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.

students who have not completed in Sem 1 and 2

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.

**Second Year B. Tech. Information Technology
Course Structure and Assessment Guidelines**

Preferred Semester: IV

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS42	Engineering Mathematics-IV	Theory	3	20	30	50	100
PC_PCC	IT05T	Operating Systems	Theory	2	15	20	40	075
	IT05P	Operating Systems Lab	Practical	1	25	-	25	050
	IT06T	Computer Networks	Theory	2	15	20	40	075
	IT06P	Computer Networks Lab	Practical	1	25	-	25	050
	IT09	Automata Theory	Theory+ Tutorial	3	40	20	40	100
	IT07T	Database Management Systems	Theory	2	15	20	40	075
	IT07P	Database Management Systems Lab	Practical	1	25	-	25	050
SC_VSEC	IT08	Skill based Lab – Python	Practical	2	50	-	25	075
Internship/OJT	IT45	Mini Project	Practical	2	25	-	50	075
OE	OE*	Any OE course	Theory	3	As per course			100
Total Credits				22				

Detailed syllabus of Second Year Semester-III

Course Name: Engineering Mathematics-III (Discrete Mathematics)

Course Code: BS41

Category: Basic Science

Preamble:

This course introduces students to various discrete structures concepts that is helpful for understanding many fundamental topics in computer science.

Pre-requisites:

Basic Mathematics

Course Objectives:

- To introduce the concepts of Set Theory and logic
- To enable the learner to understand the concepts of Relations, Functions & Graph Theory
- To enable the learner to understand the concepts of Trees and Coding Theory

Course Outcome:

Student will be able to: -

1. Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.
2. Apply function concepts in mathematical problems and proofs.
3. Understand the use of graph theory in programming applications.
4. Understand the concept of groups and cyclic group.
5. Understand the concept codes in Encoding-Decoding function.
6. Apply the Number Theory to different applications using theorem.

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

ISA: 11 Assignment is to be given to students and best 10 is to be considered for ISA.

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.

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Detailed Syllabus:

Module No	Module name	Content	No of Hours
1	Set Theory & counting Principal	Definition and Representation of Sets, Types of sets, Operations on Sets, Laws of Set, Principle of Inclusion & Exclusion (3 sets), Partition of set, Counting Principle, Pigeonhole Principle, Mathematical Induction.	06
2	Relation and Function	Definition of Relation, Representation & Properties of Relation, Closure properties of Relation (Reflexive, Symmetric and Transitive), Partial Order and Equivalence Relation, Composite and Circular Relation, Definition of Function, Types of Function, Inverse Function, Composite Functions.	08
3	Graph Theory	Definition of Graph, Types of Graphs, Graph Representation Techniques, Sub Graphs, Operations on Graphs, Walk, Path and Circuit, Connected and Disconnected Graph, Homomorphism and Isomorphism of Graphs, Euler and Hamiltonian Graphs, Planar Graph, Cut Set, Cut Vertex.	08
4	Algebraic Structures	Algebraic structures with one binary operation, Groupoid-Closure Axiom property, Semigroup- Groupoid with Associative Property, Monoid- Semigroup with identity element property, Group- Monoid with Inverse Element Property, Abelian Group- Commutative Group, Cyclic groups- Group with Generator Element Order and subgroup, Group Homomorphism, Isomorphism and Automorphism.	08
5	Coding & Decoding theory	Coding theory: Definition of encoding function, weight, Hamming Distance, Error Detection and Correction, Group codes, with Composition Table, Minimum distance, error detection and correction, Parity Check Matrix to Encoding Function Generation, Maximum Like hood Decoding Technique to Decode give codeword using Encoding Function.	06
6	Number Theory	Modular Arithmetic, Divisibility Arithmetic, Euclid Algorithm, Prime Number Theorem, Euler's Theorem, Fermat's Little Theorems, Congruences in Number Theory, Computing Inverse in Congruences, Chinese Remainder Theorem.	09
Total			45

Text Books:

1. C. L. Liu, "Elements of Discrete Mathematics", TMH, ISBN 10:0-07-066913-9.
2. N. Biggs, "Discrete Mathematics", 3rd Ed, Oxford University Press, ISBN 0 –19-850717–8.
3. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw-Hill, ISBN 978- 0-07-288008-3.
4. Cryptograph and Network Security by B. A. Forouzan & D. Mukhopadhyay, 11th edition, McGraw Hill Publication.
5. K.C. Chaudhary, A First Course in Number Theory, Asian Books Private Limited.

Reference Books:

1. Bernard Kolman, Robert C. Busby and Sharon Ross, "Discrete Mathematical Structures", Prentice-Hall of India /Pearson, ISBN: 0132078457, 9780132078450.
2. Narsingh Deo, "Graph with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0 – 87692 – 145 – 4.
3. Eric Gossett, "Discrete Mathematical Structures with Proofs", Wiley India Ltd, ISBN:978-81- 265-2758-8.
4. Sriram P. And Steven S., "Computational Discrete Mathematics", Cambridge University Press, ISBN 13: 978-0-521-73311-3.
5. Elementary Number Theory and its applications by Kenneth H. Rosen, 5th edition, Addison Wesley Publication.

Course Name: Microprocessor

Course Code: IT04T

Category: Core

Preamble:

This course is an introductory course to understand the working of the microprocessor. To introduce students to assembly language programming and to explain how the peripherals are connected to the processor. This will serve as a foundation for advanced studies in Hardware design and Embedded System Design.

Pre-requisites:

Fundamentals of Computer Hardware and Networking (ES06T), Fundamentals of Logic Circuits (ES07T), Computer Organization and Architecture (ES10T)

Course Objectives:

- To develop background knowledge and core expertise in microprocessors
- To study the concepts and basic architecture of 8086 microprocessor
- To know the importance of different peripheral devices and their interfacing with 8086
- To appreciate the architecture of advanced microprocessors

Course Outcomes:

Learner will be able to:

CO1: Understand the basics of microprocessors.

CO2: Understand operating modes of 8086 microprocessor and its pipelining.

CO3: Apply concept of assembly language programming to develop simple application programs.

CO4: Analyze and understand the necessity of the peripheral chips.

CO5: Design simple microprocessor-based system with memory & I/O devices.

CO6: Appreciate and understand the advantages of advanced microprocessors.

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 8085 Microprocessor	Evolution of INTEL microprocessors, Basic concept of 8085 architecture.	4
2	8086 Architecture and PIN configuration	8086 - Bus Interface Unit, Execution unit, Pipelined Architecture of 8086., Concept of Segmentation, Physical Address, Logical Address, 8086 – Pin description, Minimum and Maximum Mode system diagram, 8284 clock generator, 8288 bus controller.	6
3	8086 Addressing Modes & Instruction set	8086 – Addressing Modes, Instruction Set, Assembler directives and assembly language programming with 8086.	6
4	Peripheral chips	Concept of parallel peripheral interface and study of 8255 (PPI), Interrupt structure of 8086 and study of 8259 (PIC), Concept of DMA and study of 8257 (DMAC).	6
5	8086 Based System Design	Address decoders for memory interfacing, Interfacing of RAM, EPROM, and I/O chips with 8086.	4
6	Introduction of Advanced Pentium Processor Architecture	Introduction to the architecture of Pentium Processor and concept of Superscalar Architecture Comparative study of salient features of 8086, 80186,80286, 80386, 80486 and Pentium processor.	4
Total			30

Textbooks:

1. Douglas Hall, 'Microprocessors and Interfacing', TMH 2005
2. John Uffenbeck, '8086 Family: Design, programming and interfacing', PH, 2001
3. Barry Brey, 'The intel microprocessor 8086/8088,80186/8088,80286,80386,80486, Pentium and Pentium Pro Processor architecture, programming and interfacing', PHI1997

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Course Name: Microprocessor Lab

Course Code: IT04P

Category: Core

Preamble:

A professional in any field of computing should not regard the computer as just a black box that executes programs by magic. All students of computing should acquire some understanding and appreciation of a computer system's functional components, their characteristics, their performance, and their interactions. Students need to understand the addressing modes, instruction set of a microprocessor and should be able to develop simple application programs.

Pre-requisites:

Fundamentals of Computer Hardware and Networking Lab (ES06P), Fundamentals of Logic Circuits Lab (ES07P)

Course Objectives:

- To introduce learners with instruction set of a microprocessor.
- To introduce learners with enough assembly language to enhance their knowledge on today's most widely used microcomputer family.
- To improve learners' systems programming skills through programming exercises carried out by students.
- To implement solutions to problems using the concepts the learners will take through the course.

Course Outcomes:

Learner will be able to:

CO1: Understand the basics of microprocessors.

CO2: Understand operating modes of 8086 microprocessor and its pipelining.

CO3: Apply concept of assembly language programming to develop simple application programs.

CO4: Analyze and understand the necessity of the peripheral chips.

CO5: Design simple microprocessor-based system with memory & I/O devices.

CO6: Appreciate and understand the advantages of advanced microprocessors.

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

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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	Introduction to assembler directives and assembler like TASM, MASM
2	ALP using ADD, SUB, MUL, DIV instructions
3	ALP using AND, OR, XOR instructions
4	ALP for BCD to ASCII & ASCII to BCD conversion
5	ALP for block transfer using string instructions
6	ALP for block exchange
7	ALP to find out smallest & largest of the array
8	ALP to sort the array in ascending & descending order
9	ALP using BIOS routine and DOS interrupt for keyboard interface
10	ALP using BIOS routine and DOS interrupt for display interface

Textbooks:

1. Douglas Hall, 'Microprocessors and Interfacing', TMH 2005
2. John Uffenbeck, '8086 Family: Design, programming and interfacing', PH, 2001
3. Barry Brey, 'The intel microprocessor 8086/8088,80186/8088,80286,80386,80486, Pentium and Pentium Pro Processor architecture, programming and interfacing', PHI1997

Course Name: Advanced Java

Course Code: IT02T

Category: Core

Preamble:

This course introduces advanced concepts of Java programming. It covers database connectivity, networking, servlets, Java Server Pages and Enterprise Java Beans. It demonstrates web application development and database connectivity using Java programming.

Pre-requisites:

Object Oriented Programming (ES05T)

Course Objectives:

- To introduce the advanced concepts of Java
- To enable the students, develop front end applications using Java Swing
- To provide students with an understanding of database connectivity through JDBC
- To enable the students, create simple client server application using Java networking
- To introduce server-side programming using Java Servlets and JSP
- To introduce full application development using Java Enterprise Beans

Course Outcomes:

Learner will be able to:

CO1: Design graphical interface using Swing components

CO2: Implement database connectivity using JDBC.

CO3: Implement socket programming and remote method invocation

CO4: Design and implement server side programming using servlets

CO5: learn Server- side programing and create dynamic web pages using JAVA server pages

CO6: Understand the multi-tier architecture of web based enterprise applications using enterprise java beans (EJB)

Course Scheme:

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

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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	Swings	Event Handling, JFrames, Lists, Tables, Trees, Text Components, Progress Indicators, Menu, Buttons, Combo box, Component Organizers	5
2	Java database connectivity	Design of JDBC, JDBC configuration, Executing SQL statement, Query Execution, Scrollable and updatable result sets, row sets, metadata, Transaction	5
3	Networking	Networking basics, TCP IP client sockets, URL, TCP IP sever sockets, Datagrams, Remote Method Invocation (RMI)	5
4	Introduction to Java Servlets	Introduction to servlets: Need for dynamic content, java servlet technology, why servlets? Servlet API and Lifecycle: servlet API, servletConfig interface, ServletRequest and ServletResponse Interfaces, GenericServlet Class. ServletInputStream And ServletOutputStreamClasses, RequestDispatcher Interface,HttpServlet Class, HttpServletRequest and HttpServletResponse Interfaces, HttpSession Interface, Servlet Lifecycle. Working with servlets: organization of a web application, creating a web application (using netbeans), creating a servlet, compiling and building the web application	5
5	Java server Pages	Introduction, disadvantages, JSP v/s Servlets, Lifecycle of JSP, Comments, JSP documents, JSP elements, Action elements, implicit objects, scope, character quoting conventions, unified expression language.	5
6	Enterprise JAVA Bean (EJB)	Enterprise bean architecture, Benefits of enterprise bean, types of beans, accessing beans, packaging beans, creating web applications, creating enterprise bean, creating web client, creating JSP file, building and running web application.	5
Total			30

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Text Books:

1. Java EE 6 for Beginners, Sharanam Shah, Vaishali Shah, SPD
2. Core Java Vol. II – Advanced Features, Cay S. Horstmans, Gary Coronell, Eight Edition, Pearson

Reference Books:

1. Java Complete Reference, Herbert Schildt, Seventh Edition, TMH.

Course Name: Advanced Java Lab

Course Code: IT02P

Category: Core

Preamble:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences: Develop web and stand-alone applications using advanced concepts of Java.

Pre-requisites:

Object oriented programming Lab (ES05P)

Course Objectives:

- To develop front end applications using Java Swing and AWT
- To access database through JDBC
- To create the simple client server application using network protocols.
- To implement server-side programming using Java Servlets and JSP
- Full application development using Java Enterprise Beans

Course Outcomes:

Learner will be able to:

CO1: Develop programs using GUI Framework (AWT and Swing).

CO2: Handle events of AWT and Swings components.

CO3: Develop programs to handle events in Java Programming.

CO4: Develop Java programs using networking concepts.

CO5: Develop programs using database.

CO6: Develop programs using Servlets.

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

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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 Practical:

Sr No.	Title of Practical
1	Program to demonstrate use of components like Label, Button, Textbox, Checkbox and Radio Button
2	Design a registration form
3	Demonstrate different layouts
4	Program to create simple calculator using Grid Layout
5	Design a Paint application using MenuBar
6	Write a program to show use of URLConnection class
7	Write a program to implement chat using ServerSocket and Socket class
8	Write a program to implement chat using datagram
9	Write a program to create Session using cookies
10	Write a program to create JDBC connection. Perform CRUD operations

Reference Books:

Java Complete Reference, Herbert Schildt, Seventh Edition, TMH.

Course Name: Data Structures & Analysis

Course Code: IT01T

Category: Core

Preamble:

This course introduces students to different data structures that they have to understand, implement and use for real life problems. Starting from linear data structures like Stacks, Queues, link-lists till non-linear data structures like graph, trees.

Pre-requisites:

Structured Programming (ES04T)

Course Objectives:

- The fundamental knowledge of data structures.
- The programming knowledge which can be applied to sophisticated data structures.
- The fundamental knowledge of stacks queue, linked list etc.
- The fundamental knowledge of Trees, Graphs etc.
- The real time applications for stacks, queue, linked list, trees, graphs etc.

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: Create and represent graphs, including vertices, edges, adjacency matrix/ list, and traversal algorithms.

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 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	Graph	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. S. K Srivastava, Deepali Srivastava; Data Structures through C in Depth; BPB Publications; 2011.
2. Yedidya Langsam, Moshej Augenstein, Aaron M. Tenenbaum; Data Structure Using C & C++; Prentice Hall of India; 1996.
3. Reema Thareja; Data Structures using C; Oxford.

Reference Books:

1. C & Data Structures -Prof. P.S Deshpande, Prof. O.G Kakde, Dreamtech Publications.
2. Data Structure Using C- E. Balaguruswamy, McGraw Hill Publications.

Course Name: Data Structures & Analysis Lab

Course Code: IT01P

Category: Core

Preamble:

This course demonstrates familiarity with major algorithms and data structures and analyzes performance of algorithms. It is used to choose the appropriate data structure and algorithm design method for a specified application and determine which algorithm or data structure to use in different scenarios.

Pre-requisites:

Structured Programming lab (ES04P)

Course Objectives:

- To use data structures as the introductory foundation for computer automation to engineering problems.
- To use the basic principles of programming as applied to complex data structures.
- To learn the principles of stack, queue, linked lists and its various operations.
- To learn fundamentals of binary tree, graph, binary search tree, tree & graph traversal techniques.
- To learn the applications of linked lists, stacks, queues, trees and graphs.

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	-	1

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	25	-	25	50

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 practical

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

Sr. No.	Suggested Topic(s)
1	Array Implementation of Stack and Queue
2	Array implementation of circular queue
3	Array implementation of priority queue
4	Implementation of singly linked list
5	Implementation of doubly linked list
6	Implementation of circular linked list
7	Implementation of doubly circular linked list
8	Linked list implementation of stack and queue
9	Implementation of binary tree
10	Implementation of tree traversal techniques
11	Implementation of binary search tree
12	Implementation of threaded binary tree
13	Implementation of graph traversal
14	Implementation of minimum spanning tree using prim's and krukshal's algorithm
15	Implementation of shortest path using Dijkstra's algorithm
16	Implementation of infix to postfix conversion and evaluation of postfix expression
17	Implementation of sorting & searching techniques

Text Books:

1. S. K Srivastava, Deepali Srivastava; Data Structures through C in Depth; BPB Publications, 2011.
2. Yedidya Langsam, Moshej Augenstein, Aaron M. Tenenbaum; Data Structure Using C & C++; Prentice Hall of India; 1996.
3. Reema Thareja; Data Structures using C; Oxford.

Reference Books:

1. Ellis Horowitz, Sartaj Sahni; Fundamentals of Data Structures; Galgotia Publications; 2010.
2. Jean Paul Tremblay, Paul G. Sorenson; An introduction to data structures with applications; Tata Mc Graw Hill; 1984.
3. Rajesh K. Shukla; Data Structures using C and C++; Wiley India; 2009.

Course Name: Principle of Communication

Course Code: OE13

Category: Basic Science(MDM)

Preamble:

This course introduces to basic working of Analog and Digital communication system. It is used to understand different analog as well as digital modulation techniques we use for transmission of signals in different applications. It helps to determine impact of noise on communication system.

Pre-requisites:

Physics (BS14P)

Course Objectives:

- To study the basic of Analog and Digital Communication Systems.
- To describe the concept of Noises in communication and its various parameters.
- To acquire the knowledge of different modulation techniques such as AM, FM and study the block diagram of transmitter and receiver.
- To study the sampling theorem and pulse Analog and digital modulation techniques.
- To learn the concept of multiplexing.
- To understand digital band pass modulation techniques.

Course Outcomes:

Learner will be able to:

CO1: Understand the basic elements of communication system.

CO2: Differentiate types of noise and its impact on communication systems.

CO3: Compare transmitter and receiver of AM, DSB, SSB and FM.

CO4: Describe Analog and digital pulse modulation systems.

CO5: Illustrate the principles of multiplexing and demultiplexing techniques.

CO6: Describe digital band pass modulation techniques.

Course Scheme:

Contact Hours		Credit 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 communication systems	Basic block diagram of Analog and Digital communication system. Types of communication channel. Self-learning topics: application areas of Analog and Digital communication.	2
2	Noise in communication system	Basics of signal representation and analyses, Types of Noise, Noise Parameters-Signal to Noise ratio, Noise factor, Noise Figure, Friss formula and equivalent noise temperature. Self-learning topics: Introduction to Fourier Transform and its property.	4
3	Amplitude and Angle Modulation Technique	Need for modulation, Amplitude modulation techniques, DSBFC-AM, DSBSC-AM, SSB-AM- block diagram, Spectrum, waveform, bandwidth, power calculations. Generation of AM and its different types, TRF receiver and Super heterodyne receiver and its characteristics. Angle Modulation FM: Principle of FM, Waveform, spectrum, bandwidth. FM generation: Direct method (Varactor diode), Indirect method (Armstrong method). FM demodulator-Foster Seeley Discriminator. Self-learning topics: Use of AM and FM in modern communication Technology.	10
4	Pulse Analog Modulation and Digital Modulation	Sampling Theorem, PAM, PWM and PPM generation and degeneration. Quantization process, Pulse code modulation, delta modulation, Adaptive delta modulation. Introduction to line codes.	7

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		Self-learning topics: Line coding and ISI	
5	Multiplexing Techniques	Principle of Time Division Multiplexing, Frequency Division Multiplexing, Wavelength Division Multiplexing, Code Division Multiplexing. Self-learning topics: Orthogonal Frequency Division Multiplexing, Space Division Multiplexing.	3
6	Digital Band Pass Modulation Techniques	Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Q-PSK generation and detection.	4
Total			30

Textbooks:

1. George Kennedy and Bernard Davis, "Electronics Communication System", Tata McGraw Hill, 5th edition.
2. Simon Haykin, Michael Moher, "Introduction to Analog and Digital Communications", Wiley India Pvt. Ltd. 2nd Ed.

Reference Books:

1. Wayne Tomasi, "Electronics Communication Systems, Pearson Publication, 5th Ed.
2. B.P. Lathi, Zhi Ding "Modern Digital and Analog Communication system", Oxford University Press, Fourth edition.
3. Herbert Taub, Donald L Schilling, Goutam Saha, "Principle of communication Systems", TataMcGraw Hill, 3rd Ed.
4. K. Sam Shanmugam, "Digital and Analog Communication Systems", Wiley India Pvt. Ltd., 1st Ed.

Course Name: Chemistry

Course Code: BS19

Category: Basic Science

Preamble:

This course of Chemistry imparts the students sound knowledge on the principles of chemistry involving different application-oriented topics required in technology & engineering.

Pre-requisites:

Basic Chemistry

Course Objectives:

The contents of this course will aid in quantification and understanding the applications of several concepts in Chemistry.

- To appreciate the need for and importance of engineering chemistry for industrial and domestic use.
- To gain knowledge on existing and future upcoming materials used in device fabrication.
- To impart knowledge of green chemical technology and its applications.
- To enhance the thinking capabilities in line with the modern trends in engineering and technology.

Course Outcome:

Student will be able to:

CO1: Interpret properties, synthesis, and uses of important materials in various engineering applications.

CO2: Apply the fundamentals of electrochemistry in prevention & control measures related to corrosion of structures and devices.

CO3: Associate Green Chemistry principles in product development knowledge.

CO4: Students will be able to perform standard computational chemistry tasks.

Course Scheme:

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

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	75	-	-	075

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Detailed Syllabus:

Module no	Module name	Content	No of Hours
1	Engineering Materials- Nanomaterials & Composite Materials	<p>Advanced polymeric materials: Advanced polymeric materials: Conducting polymers- Polypyrrole, Polyaniline, polythiophene, (properties & applications), Light Emitting polymers (LEPs), Liquid crystal properties. In computers- electronics engineering materials used in computers</p> <p>Nanomaterials: Introduction, Fullerenes, Carbon nanotubes, Nanowires, Electronic and mechanical properties, Applications of nanomaterials - Catalysis, Electronics & Telecommunication, Medicines, Energy sciences.</p> <p>Composite Materials: Basics of composites, Types of Composites: Particle, Fibre, Reinforced, Structural, Real-life applications.</p> <p>Smart materials: Shape Memory Alloys, piezo-electric, chromo-active, photo active materials, etc. required in computer field Packaging materials, Package substrates, Board fabrication Solder material- lead-free fabrication, Cooling- best liquid coolant, Magnets in the laptop speakers-neodymium magnets, rare earth alloys.</p>	8
2	Electrochemistry, Corrosion and Corrosion Control	<p>Electrochemistry- types of electrochemical cells, Electrochemical series and Galvanic series, Numerical problems on Nernst equation Definition of corrosion, Direct chemical corrosion- Oxidation corrosion, Electrochemical corrosion and its mechanisms, Types of electrochemical corrosion- differential aeration, galvanic, stress, Intergranular, Microbial (soil) corrosion. Factors affecting corrosion (general factors), Protection of corrosion- anodic & cathodic protection, Coatings- Organic & Metallic, Applications with few practical problems of corrosion. Numerical problems based on Faraday's law Case studies like- Corrosion in electronic gadgets</p>	9
3	Chemistry of Semiconductors	<p>Silicon & Germanium - Physical and atomic properties, Isotopes, Chemistry and compounds, applications in industry. Study of compounds- GaAs, GaP, InP. Problems in Semiconductor industry- Shortage of semiconductors, the degradation due to corrosion, the alternative materials, reusability of the semiconductors Strengthening of semiconductors using chemical methods</p>	6
4	Green Chemistry	Introduction to Green Chemistry, 12 Principles of Green Chemistry	3
5	Introduction to Computational chemistry	<p>The students are expected to write and execute at least six of the following computer programs in BASIC/Fortran/C</p> <p>1. Linear regression.</p>	4

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		2. Quadratic equation. 3. Simultaneous pH titration. 4. Michaelis Menten based enzyme kinetics. 5. Analysis of amino acid sequencing. 6. Analysis of DNA sequences. Complementary sequences, repeat frequencies etc. 7. Handling of atomic coordinates files and distance statistics in large molecules. 8. Determination of number of covalent and weak bonds in a given coordinate data for protein molecule. (any 2)	
		Total	30

Textbooks:

1. Shashi Chawla, "A Textbook of Engineering Chemistry", Dhanpat Rai & Co. (PVT.) LTD., New Delhi (2004).
2. S. S. Dara, "Engineering Chemistry", Chand & Co, New Delhi (2006)
3. Jain and Jain, "Engineering Chemistry", Dhanpat Rai & Co (PVT.) LTD, New Delhi (2006).

Reference Books:

1. B.R. Puri and L.R. Sharma, "Principles of Physical Chemistry", 45th Edition, Vishal Publishing Co. 2012.
2. Peter Atkins, "Physical Chemistry", XI th ed, Oxford, United Kingdom, Oxford University Press, 2017
3. V. K. Ahluwalia, "Green Chemistry: A textbook", Alpha Science International
4. J. D. Lee, "Concise Inorganic Chemistry"
5. V.R.Gowariker, "Polymer Science", New Age International Publication
6. S.K.Kulkarni, "Introduction to Nanotechnology"
7. C. N. Banwell, Elaine M. McCash, "Fundamentals of Molecular Spectroscopy", (4th edition), Tata McGraw Hill.
8. Y.R. Sharma, "Elementary Organic Spectroscopy", S. Chand and Co.
9. William D. Callister, "Materials Science and Engineering: An Introduction", Wiley
10. Mel Schwartz, "Smart Materials", CRC Press New York, 2009
11. Dimitris C. Lagoudas, "Shape Memory Alloys", Springer, New York, 2008
12. Micky Rakotondrabe, "Smart Materials- Based Actuators at Micro/Nano-Scale", Springer Science + Business Media, New York, 2013
13. Computer and Chemistry: introduction to programming and numerical methods T. R. Dickson, Freeman (1968)
14. Computer programs for chemistry D. F. Detar W. A. Benjamin Inc, New York Vol. 1-3 (1968-69)

Course Name: Presentation Skills

Course Code: HS04

Category: Humanities and Social Sciences (HSS)

Preamble:

The course, Presentation Skills, is intended to equip students with the necessary skill-set to help them bridge the gap from the campus to the corporate world. It will help them to be industry ready in sync with the requirements of the program they are pursuing.

Pre-requisites:

Nil

Course Objectives:

- To familiarize students about constructing a personal brand effectively.
- To create engaging and deliver effective business presentation skills by utilizing digital tools.
- To apply communication and strategic planning in business plan pitches and presentations.
- To develop an appreciation for cultural diversity and enhance intercultural communication skills.
- To understand the nuances of storyboarding and storytelling
- To present oneself professionally in interviews, group discussions and various corporate situations.

Course Outcomes:

Student will be able to:

CO1 Understand the significance of brand-building and apply strategies to construct an effective personal brand.

CO2 Demonstrate proficiency in delivering impactful presentations by utilizing digital tools and applying structured communication principles.

CO3 Proficient in crafting comprehensive business plans by employing persuasive marketing and financial strategies and implementation plans.

CO4 Craft engaging visual stories through storyboarding and storytelling, create compelling video presentations.

CO5 Demonstrate readiness for placements by gaining practice in aptitude tests, HR interviews and GDs, and crafting professional resumes.

CO6 Understand intercultural communication, global citizenship, and respect cultural diversity.

Course Scheme:

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

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	50	-	-	050

ISA: 50 Marks (30 Marks for assignments + 20 Marks for Presentations)

Detailed Syllabus:

Module No.	Module Name	Content	No. of Hours
1	Personal Branding	Introduction to Personal Branding –Purpose, Significance, Benefits and Techniques to build a personal Brand	06
		Corporate/Organisational Branding	
		Online identity of Brand on social media	
		Maintenance and Improvement of your Brand	
		Factors affecting your Brand	
2	Corporate Presentations	Business Presentation Tips	04
		Digital Presentations	
		PAIBOC Model and Minto Pyramid Principles	
3	Business Plan Presentations	Introduction to Business Plans	06
		Company Overview & Industry Analysis	
		Persuasive Communication in Marketing Strategy	
		Operations Strategy in Financial Management	
		Implementation Plan	
4	Storyboarding and Storytelling	Visual Story Telling	04
		Video Presentations	
		Story Structure with images	
		Film and Animation	
5	Placement Readiness	Mock HR Interviews	06
		Mock GDs	
		Aptitude Tests	
		Placement ready resume	
6	Global Communication	An introduction to inter-cultural communication	04
		Introduction to languages and cultures	
		Global media in mass communication	
		Tips to become a global citizen	
		Respecting cultural diversity	
Total			30

Guidelines to conduct practical sessions:

1. Personal Branding

2. Personal Branding
3. Personal Branding
4. Corporate Presentations
5. Corporate Presentations
6. Business Plan Presentations
7. Business Plan Presentations
8. Business Plan Presentations
9. Storyboarding and Storytelling
10. Storyboarding and Storytelling
11. Placement Readiness
12. Placement Readiness
13. Placement Readiness
14. Global Communication
15. Global Communication

List of Assignments:

1. Personal Branding (Individual)
2. Corporate Presentations (Group)
3. Business Plan Presentations (Group)
4. Storyboarding and Storytelling (Group)
5. Global Communication (Individual)

Skill Set:

1. Placement readiness and Personal branding techniques (H)
2. Corporate presentation and Business Plan techniques (M)
3. Inter-cultural communication to handle industry clients (H)

Tool Set:

1. Software for visual storytelling, film and animation
2. Software for digital presentations

Recommended Online Courses:

1. Introduction to Personal Branding - <https://www.coursera.org/learn/personal-branding>
2. Strategic Self-Marketing and Personal Branding - <https://www.coursera.org/learn/self-marketing>
3. Learn to Storyboard for Film or Animation - <https://www.udemy.com/course/storyboard-for-film-or-animation/>
4. Powerful Tools for Teaching and Learning: Digital Storytelling - <https://www.coursera.org/learn/digital-storytelling>
5. Presentation Skills: Speechwriting, Slides and Delivery Specialization - <https://www.coursera.org/specializations/presentation-skills>
6. Business English for Cross-Cultural Communication - <https://www.coursera.org/learn/cross-cultural-communication-business>

Reference Books:

Vidyalankar Institute of Technology (An Autonomous Institute affiliated to University of Mumbai)

1. Personal Development for Life and Work, Wallace and Masters, Thomson Learning
2. Organizational Behaviour, Robbins Stephens, Pearson Education
3. Me 2.0: 4 Steps to Building Your Future, Dan Schawbel, Diversion Books
4. Branding Pays: The Five-Step System to Reinvent Your Personal Brand, Karen Kang, Branding Pays Media
5. The Presentation Secrets of Steve Jobs: How to Be Insanely Great in Front of Any Audience, Carmine Gallo, McGraw Hill Education
6. Talk Like TED: The 9 Public-Speaking Secrets of the World's Top Minds, Carmine Gallo, St. Martin's Press
7. The Storytelling Animal: How Stories Make Us Human, Jonathan Gottschall, Mariner Books
8. Made to Stick: Why Some Ideas Survive and Others Die, Chip Heath and Dan Heath, Random House
9. The Culture Map: Decoding How People Think, Lead, and Get Things Done Across Cultures, Erin Meyer, Public Affairs
10. Kiss, Bow, or Shake Hands: The Bestselling Guide to Doing Business in More Than 60 Countries, Terri Morrison and Wayne A. Conaway, Adams Media
11. Brand Thinking and Other Noble Pursuits, Debbie Millman, Allworth
12. Building a Brand Story: Clarify Your Message So Customers Will Listen, Donald Miller, HarperCollins

Detailed syllabus of Second Year Semester-IV

**Second Year B. Tech. Information Technology
IV Course Structure and Assessment Guidelines**

Preferred Semester:

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS42	Engineering Mathematics-IV	Theory	3	20	30	50	100
PC_PCC	IT05T	Operating Systems	Theory	2	15	20	40	075
	IT05P	Operating Systems Lab	Practical	1	25	-	25	050
	IT06T	Computer Networks	Theory	2	15	20	40	075
	IT06P	Computer Networks Lab	Practical	1	25	-	25	050
	IT09	Automata Theory	Theory+ Tutorial	3	40	20	40	100
	IT07T	Database Management Systems	Theory	2	15	20	40	075
	IT07P	Database Management Systems Lab	Practical	1	25	-	25	050
SC_VSEC	IT08	Skill based Lab – Python	Practical	2	50	-	25	075
Internship/OJT	IT45	Mini Project	Practical	2	25	-	50	075
MDM	MDXX*	Any MDM course	Theory	3	As per course			100
Total Credits				22				

Course Name: Engineering Mathematics-IV

Course Code: BS42 (NEP)

Category: BS

Preamble:

This course introduces students to various discrete structures concepts that is helpful for understanding many fundamental topics in computer science.

Pre-requisites:

Basic Mathematics

Course Outcome:

Student will be able to: -

Use statistical methods to analyze and interpret data sets.

Analyse the behaviour of discrete and continuous probability distributions.

Apply the statistics for testing the significance of the given large and small sample data

Use the non-parametric test for testing of Hypothesis

Apply LPP technique to optimize the functions

Apply various techniques of Operation research to solve Non-Linear Programming Problems

Course Scheme:

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

Examination Scheme:

ISA	MSE	End Sem Exam	Total
20	30	50	100

ISA: 11 Assignment is to be given to students and best 10 is to be considered for ISA

Detailed Syllabus:

Module no	Module name	Content	No of Hours
1	Statistical techniques	<ul style="list-style-type: none"> • Karl Pearson’s coefficient of correlation (r) • Spearman’s Rank correlation coefficient (R) (with repeated and non-repeated ranks) • Lines of regression: fitting of curves <p>Self-learning Topics: Fitting of exponential curve, and Applications of statistical techniques in data Sciences.</p>	8
2	Probability Distribution	<ul style="list-style-type: none"> • Random Variable: Probability distribution for discrete and continuous random variable. • Bayes Theorem (without proof) • Expectation, Variance, (without MGF function) • Probability distributions: Poisson and Normal distributions. <p>Self-learning Topics: Moment Generating Function (MGF), Applications of Normal Distribution, Levene's test & Continuous uniform distributions in Machine Learning and Data Analysis.</p>	8
3	Testing of Hypothesis	<ul style="list-style-type: none"> • Formation of Hypothesis • Test of significance for Small samples: t- Test for single mean, difference of means. <p>Self-learning Topics: Large sample test, Applications of small & large samplings in Computer science.</p>	6
4	Non-parametric test and Anova	<ul style="list-style-type: none"> • χ^2-distribution: - Chi-square test for goodness of fit and independence of attributes. • F- test for ratio of variances. • Analysis of Variance (One Way ANOVA) <p>Self-learning Topics: Applications of χ^2-distribution, loglinear analysis, F-distributions & ANOVA tests in Computer sciences.</p>	7
5	Linear Programming	<ul style="list-style-type: none"> • Simplex method. • Artificial variables & Big-M method (Method of penalty). • Duality, Dual of LPP • Dual Simplex Method. <p>Self-learning Topics: Sensitivity Analysis, Two-Phase Simplex and revised Simplex methods, linear programming problems from Mathematical form into Optimization Toolbox solver syntax using the problem-based approach through MATLAB.</p>	8
6	Non-linear programming	<ul style="list-style-type: none"> • NLPP with one equality constraint (two or three variables) using the method of Lagrange’s multipliers. • NLPP with two equality constraints. • NLPP with inequality constraint: Karush-Kuhn-Tucker conditions (KKT) <p>Self-learning Topics: NLPP with two inequality constraints, One-dimensional search method (Golden Search method, Newton’s method). Gradient Search method and its applications in optimization of Big data.</p>	8
Total			45

Textbooks:

1. Dr. B. V. Ramana, Higher Engineering Mathematics, 12th edition, Tata McGraw Hill New Delhi, India
2. P. N. Wartikar & J. N. Wartikar, A Test Book of Applied Mathematics, Vol I & II, 12th edition Vidyanarhi Griha Prakashan.
3. Kanti B Datta, Mathematical methods of Science and Engineering, Cengage Learning, 2012
4. N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications 2006.
5. Hamdy A Taha, "Operations Research: An Introduction, Pearson 10th edition, July 2021.

Reference Books:

1. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India
2. D. C. Montgomery and G. C. Runger, Applied Statistics and Probability for Engineers, Wiley.
3. J. L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning.
4. Operations Research: Theory and Applications" by S.D. Sharma and Kedar Nath Ram Nath.
5. Singiresu S.Rao, Engineering Optimization, New Age International.

Course Name: Operating System

Course Code: IT05T

Category: Core

Preamble:

The goal of the course is to introduce the students to modern operating systems design. This course covers the design and implementation of operating systems with a focus on modern, concurrent kernels.

Pre-requisites:

Data Structure & Analysis (IT01T), Computer Organization & Microprocessor (IT04T)

Course Objectives:

- To understand the major components of Operating System & its functions.
- To introduce the concept of a process and its management like transition, scheduling, etc.
- To understand basic concepts related to Inter-process Communication (IPC)
- To understand the concepts and implementation of memory management policies and virtual Memory.
- To understand functions of Operating System for storage management and device management.
- To study the need and fundamentals of special-purpose operating system with the advent of new emerging technologies.

Course Outcomes:

Learner will be able to:

CO1: Recall fundamental concepts and structures of operating systems, including process management, memory management, and distributed systems.

CO2: Explain the principles of process scheduling, synchronization, deadlock, memory management, and distributed systems.

CO3: Apply scheduling algorithms, synchronization techniques, deadlock handling, and memory allocation strategies to solve OS-related problems.

CO4: Analyze synchronization problems, deadlock situations, memory management techniques, and distributed system behaviors.

CO5: Evaluate the effectiveness of disk scheduling methods, deadlock strategies, memory management, and distributed system techniques.

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 Operating System	Operating System definitions, Processes and Interrupts, Functions of Operating System, Operating System Structures, User mode and kernel mode of a process, Types of Operating System, System Calls, Booting.	4
2	Process Management and Synchronization	Process Management: Definition of Process, Process Control Block, Process Scheduling: Types and scheduling algorithms (FCFS, SJF, SRTN, Priority, RR), Threads: Definition and Concept of Multithreading. Process Synchronization: Principles of Concurrency, Inter-process communication, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Producer and Consumer problem.	6
3	Deadlock	Principles of Deadlock: Conditions and Resource, Allocation Graphs, Deadlock Prevention, Deadlock Avoidance: Banker's Algorithm, Deadlock Detection and Recovery, Dining Philosophers Problem.	6
4	Memory Management	Memory Management Requirements, Memory Partitioning: Fixed, Partitioning, Dynamic Partitioning, Memory Allocation Strategies: Best-Fit, First Fit, Worst Fit, Paging and Segmentation, TLB, Page table design. Virtual Memory: Demand Paging, Page Replacement Strategies: FIFO, Optimal, LRU, Thrashing, Kernel Memory Allocation.	6
5	File Systems and I/O Management	Files and File Systems, Directory Systems, File allocation methods: Contiguous allocation, Linked allocation, Indexed allocation, Kernel I/O subsystem, Communication and Data Transfer with I/O Devices, Disk Organization, I/O Management and Disk Scheduling: FCFS, SSTF, SCAN, CSCAN, LOOK, C-LOOK, RAID Structure.	5
6	Distributed Systems	Distributed operating System: Network based OS, Network Structure and Topology, Communication Structure and Protocols; Distributed File system: Naming and transparency, Remote file access, Stateful Versus Stateless Service, File Replication; Distributed Synchronization:	3

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	Mutual Exclusion, Concurrency Control and Deadlock Handling.	
Total		30

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Greg Gagne, Peter Baer Galvin, 8th edition Wiley.
2. Modern Operating System, Tanenbaum, Pearson Education.
3. Operating Systems: Internal and Design Principles: William Stallings, PHI

Reference Books:

1. Operating System Design and Implementation, A Tanenbaum, Pearson.
2. Real Time Systems Design and Analysis, Wiley, IEEE Press.
3. Principles of Operating Systems: Naresh Chauhan, Oxford Higher Education

Course Name: Operating Systems Lab

Course Code: IT05P

Category: Core

Pre-requisites:

Structured Programming Lab (ES04P)

Preamble:

This course will make students to understand the main components of an OS & their functions. To study the concepts and implementation of Process management, Memory management and file management. This will help students to study the need for special purpose operating system with the advent of new emerging technologies.

Course Objectives:

- To gain practical experience with designing and implementing concepts of operating systems such as system calls, CPU scheduling, process management, memory management, file systems and deadlock handling using C language in Linux environment.
- To familiarize students with the architecture of Linux OS.
- To provide necessary skills for developing and debugging programs in Linux environment.
- To learn programmatically to implement simple operation system mechanisms

Course Outcomes:

Learner will be able to:

CO1: Demonstrate basic Operating system Commands, Shell scripts, System Calls and API wrt Linux

CO2: Implement various process scheduling algorithms and evaluate their performance

CO3: Implement and analyze concepts of synchronization and deadlocks.

CO4: Implement various Memory Management techniques and evaluate their performance.

CO5: Implement and analyze concepts of virtual memory.

CO6: Demonstrate and analyze concepts of file management and I/O management techniques.

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 practicals based on the following suggested topics.

Sr No	Suggested Topic(s)
1	Explore usage of basic Linux Commands and system calls for file, directory and process management.
2	Write shell scripts to do the following: a. Display OS version, release number, kernel version b. Display top 10 processes in descending order c. Display processes with highest memory usage. d. Display current logged in user and log name. e. Display current shell, home directory, operating system type, current path setting, current working directory.
3	Write a program to demonstrate the concept of non-preemptive scheduling algorithms.
4	Write a program to demonstrate the concept of preemptive scheduling algorithms
5	Write a program to implement solution of Producer consumer problem through Semaphore
6	a. Write a program to demonstrate the concept of deadlock avoidance through Banker's Algorithm b. Write a program demonstrate the concept of Dining Philosopher's Problem
7	Write program to demonstrate the concept of dynamic partitioning placement algorithms
8	a. Write a program to demonstrate the concept of demand paging for simulation of Virtual Memory implementation b. Write a program in C demonstrate the concept of page replacement policies for handling page faults eg: FIFO, LRU etc.
9	a. Write a program to simulate File allocation strategies typically sequential, indexed and linked files b. Write a program to simulate file organization of multi-level directory structure
10	Write a program to do disk scheduling - FCFS, SCAN, C-SCAN

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Greg Gagne, Peter Baer Galvin, 8th edition Wiley.
2. Modern Operating System, Tanenbaum, Pearson Education.
3. Operating Systems: Internal and Design Principles: William Stallings, PHI

Reference Books:

1. Operating System Design and Implementation, A Tanenbaum, Pearson.
2. Real Time Systems Design and Analysis, Wiley, IEEE Press.
3. Principles of Operating Systems: Naresh Chauhan, Oxford Higher Education

Course Name: Computer Networks

Course Code: IT06T

Category: Core

Preamble:

This course is to provide students with an overview of the concepts and fundamentals of computer networks. To understand the protocol layering and physical level communication. This subject will help to analyse the performance of a network. It helps to learn the functions of OSI & TCP/IP model and the various routing protocols.

Pre-requisites:

Fundamentals of Computer Hardware and Networking (ES06T)

Course Objectives:

- Describe the functions of each layer in the OSI and TCP/IP models
- Explain the characteristics and real-time applications of different types of transmission media.
- Apply the various error detection and correction techniques to solve collisions problems.
- Analyze the behavior and effectiveness of different routing protocols in various networking scenarios.
- Discuss the design issues of the session layer and the services provided by the transport layer.
- Explain the paradigms and protocols associated with the application layer and presentation layer.

Course Outcomes:

Students will be able to:

CO1: Recall the functions and components of each layer in the OSI and TCP/IP models.

CO2: Explain the various types of switching techniques.

CO3: Describe the functions of the data link layer and explain its associated protocols.

CO4: Apply IP addressing techniques to design and configure a network using appropriate routing protocols.

CO5: Describe the Session layer design issues and Transport layer services.

CO6: Explain the functions of Application layer and Presentation layer paradigms and Protocols.

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

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Detailed Syllabus:

Module No.	Module Name	Content	No of Hours
1	Introduction to Computer Network	Introduction to OSI reference model, TCP/IP Model Self-Study: Introduction to computer network, network application, network software and hardware components, Types of networking devices, Features of computer network, types of network architecture, Computer Network types.	2
2	Physical Layer	Switching Techniques: Circuit switching, Message switching, Packet switching. Self-study: Network topologies, Transmission modes, Multiplexing, Transmission medium	2
3	Data Link Layer	Functions of DLL, Framing and Flow Control, Error Detection and correction, ARQ strategies: Stop-and-Wait, Go-Back-N, Selective Repeat. Data Link layer protocols: HDLC and PPP, The channel allocation problem, Multiple access protocols: ALOHA, Slotted ALOHA, CSMA Protocol, CSMA/CD Protocol, CSMA/CA Protocol, Random Access channel, Controlled Access channel, Channelization. Concept of VLAN.	6
4	Network Layer	Functions of Network layer, IPv4 and IPv6 Protocol, IP addressing, Subnetting, Supernetting, Transition from IPV4 to IPV6. NAT and PAT (Network Address Translation and Port Address Translation. Principles of Routing; Types of routing algorithms, Classes of routing algorithms, Properties of routing algorithms, Routing algorithms; Shortest path algorithm, Flooding, Distance vector routing, Hierarchical routing, Link state routing Congestion control mechanism, Protocols: RIP, OSPF, BGP.	8
5	Transport Layer	Transport Layer Services, Connectionless & Connection-oriented Protocols, User Datagram Protocol: UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, Segment, A TCP Connection, Windows in TCP, Flow Control, Error Control, TCP Congestion Control, TCP Timers, Port Numbers and Sockets.	4
6	Session Layer and Presentation Layer	Session Layer: Functions, Session Layer protocol - Remote Procedure Call (RPC). Compression: Comparison between Lossy Compression and Lossless Compression, Huffman Coding, Speech Compression, LZW, RLE, Image Compression – GIF, JPEG.	4

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7	Application Layer	Application layer: Standard Client-Server Protocols: World Wide Web, HTTP, FTP, Electronic Mail, Domain Name System (DNS), SNMP	4
Total			30

Textbooks:

1. Behrouz A. Forouzan, Forouzan Mosharrat , Computer Networks A Top down Approach, Mc Graw Hill education.
2. Andrew S Tanenbaum, Computer Networks -, 4th Edition, Pearson Education.
3. Ranjan Bose, Information Theory, Coding and Cryptography, Ranjan Bose, Tata McGrawHill , Second Edition.
4. Diane Teare, Authorized Self- Study Guide Designing for CISCO Internetwork Solutions(DESIGN), Second Edition.

Reference Books:

1. Andrew S Tanenbaum, Computer Networks -, 4th Edition, Pearson Education.
2. Behrouz A. Forouzan, Data Communications and Networking, 4th Edition, Mc Graw Hill education.S. Keshav, An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education.
3. B. A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill edition, Third Edition.
4. Ranjan Bose, Information Theory, Coding and Cryptography, Ranjan Bose, Tata McGrawHill , Second Edition.
5. Khalid Sayood, Introduction to Data Compression, Third Edition, Morgan Kaufman.

Course Name: Computer Networks Lab

Course Code: IT06P

Category: Core

Preamble:

This course is to provide students with an overview of the concepts and fundamentals of computer networks. To understand the protocol layering and physical level communication. This subject will help to analyse the performance of a network. It helps to learn the functions of OSI & TCP/IP model and the various routing protocols.

Pre-requisites:

Fundamentals of Computer Hardware and Networking Lab (ES06P), Structured Programming Lab (ES04P)

Course Objectives:

- Recall and perform basic networking commands.
- Understand the concepts of switching commands and VLAN implementation in networks.
- Configure and apply IP addressing and static routing for network design.
- Implement and configure dynamic routing protocols, including EIGRP, OSPF, and BGP.
- Use access lists to filter network traffic in practical scenarios.
- Install and configure the Wireshark tool for network traffic analysis.

To observe and study the traffic flow and the co

Course Outcomes:

Learner will be able to:

CO1: Demonstrate knowledge of basic networking commands and their functionality in diagnosing network connectivity.

CO2: Illustrate the concepts of VLANs and their application in network segmentation.

CO3: Diagnose and resolve network connectivity issues using tools like Wireshark.

CO4: Analyze routing table updates and packet forwarding behavior in dynamic routing protocols.

CO5: Assess the performance of various application layer protocols, including DNS, HTTP, FTP, and TELNET, through hands-on demonstrations.

CO6: Develop a complete network configuration involving VLANs, static and dynamic routing, and access list filtering.

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical

-	2	-	1
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Assessment guidelines:

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

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Suggested List of Practicals

Learners are expected to perform practicals based on the following suggested topics.

Sr No	Suggested Topic(s)
1	Study, understand and perform various Basic networking commands: Ping, Tracert, trace route, ipconfig, ifconfig, nslookup, netstat.
2	Switching commands. Design and implement VLAN.
3	IP addressing and static routing.
4	Implementing dynamic routing using EIGRP
5	Implementing dynamic routing using ospf
6	Implementing dynamic routing using BGP
7	Filtering network traffic using access list
8	Installation and configuration of Wireshark tool Study the packet transmission using Wireshark and understand/visualize the IP protocol Troubleshooting network connectivity issues using wireshark.
9	Demonstration of Application layer protocol DNS, HTTP, HTTPS, SSH, FTP, SFTP, TELNET.

Text Books:

1. Computer Network Simulation in NS2 Basic Concepts and Protocol Implementation.-Prof Neeraj Bhargava, Pramod
2. Singh Rathore, Dr. Ritu Bhargava, Dr. Abhishek Kumar, First Edition. BPB Publication.
3. Packet analysis with Wire shark, Anish Nath, PACKET publishing
4. TCP/IP Protocol Suite 4th Edition by Behrouz A. Forouzan

Reference Books:

1. NS2.34 Manual
2. Practical Packet Analysis: Using Wireshark to Solve Real-World Network Problems by Chris Sanders

Course Name: Automata Theory

Course Code: IT09

Category: Core

Preamble:

Automata theory (also known as Theory of Computation) is a theoretical branch of Computer Science and Mathematics, which mainly deals with the logic of computation with respect to simple machines, referred to as automata.

Pre-requisites:

Engineering Mathematics-III (BS05)

Course Objectives:

- To formalize mathematical models of computation: basic machines, deterministic and non deterministic machines and pushdown machines and Turing Machines.
- To learn fundamentals of formal grammars and languages.
- Develop understanding of different types of Turing machines, their use, capabilities & limitations.
- Understand the concept of Undecidability.

Course Outcomes:

Learner will be able to:

CO1: Explain, analyze and design Regular languages, Expression and Grammars.

CO2: Design different types of Finite Automata and Machines as Acceptor, Verifier and

Translator. CO3: Analyze and design Context Free languages and Grammars.

CO4: Design different types of Push down Automata as Simple Parser.

CO5: Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.

CO6: Understand the concept of Undecidability

Course Scheme:

Contact Hours		Credits Assigned
Theory	Tutorial	Theory + Tutorial
2	1	3

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Theory	40	20	40	100

The assessment/evaluation guidelines for the courses of different credits are mentioned in the above table. Notwithstanding the above, each course faculty shall decide her/his assessment methodology based on the

course's nature. 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	Finite Automata	DFA, NFA, NFA with and without ϵ , RE to NFA, NFA to DFA, Reduced DFA, NFA-DFA equivalence, Finite State Machines with output : Moore and Mealy machines. Moore and Mealy M/C conversion.	08
2	Regular Languages	Alphabets and Strings. Regular Languages: Regular Expressions, Regular Languages, Regular Grammars, RL and LL grammars, Closure properties	04
3	Context Free Grammars and Languages	CFG, Leftmost, Rightmost derivations, Ambiguity in grammars and languages. Simplification of Context Free Grammars, Chomsky normal form (CNF), Greibach normal form (GNF), Pumping Lemma for Context Free Languages.	08
4	Push Down Automata	Deterministic (single stack) PDA, Equivalence between PDA and CFG. Power and Limitations of PDA, examples of PDA.	04
5	Turing Machine	Deterministic TM, Variants of TM, Halting problem, Power of TM.	04
6	Undecidability and Recursively enumerable languages	Recursive and Recursively enumerable languages, Context-Sensitive Languages and the Chomsky Hierarchy. Unsolvable Problems: Halting Problem, Post's Correspondence Problem (PCP)	02
Total			30

Text Books:

1. Kavi Mahesh, "Theory of Computation A Problem Solving Approach", Wiley India
2. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education.
3. J.C.Martin, "Introduction to languages and the Theory of Computation", TMH.

Reference Books:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
2. Daniel I.A. Cohen, "Introduction to Computer Theory", John Wiley & Sons
3. Michael Sipser, "Theory of Computation", Cengage Learning

Suggested Tutorial Plan

1. Tutorial on Finite State Machine, DFA, NFA
2. Tutorial on Mealy and Moore Machine.
3. Tutorial on Regular Expression
4. Tutorial on Grammar
5. Tutorial on Push down Automata
6. Tutorial on Turing Machine
7. Tutorial on Undecidability

Course Name: Database Management System

Course Code: IT07T

Category: Core

Preamble:

Database Management Systems course is intended to deliver students the elementary concepts of a database management system. It also introduces advanced level areas like transaction processing, concurrency control and recovery management.

Pre-requisites:

Data Structures & Analysis (IT01T)

Course Objectives:

- To learn the basics and understand the need of database management system.
- To construct conceptual data model for real world applications
- To Build Relational Model from ER/EER.
- To introduce the concept of SQL to store and retrieve data efficiently.
- To demonstrate notions of normalization for database design.
- To understand the concepts of transaction processing- concurrency control & recovery procedures.

Course Outcomes:

Learner will be able to:

CO1: Identify the need of Database Management System.

CO2: Design conceptual model for real life applications.

CO3: Create Relational Model for real life applications

CO4: Formulate query using SQL commands.

CO5: Apply the concept of normalization to relational database design.

CO6: Demonstrate the concept of transaction, concurrency control, and recovery.

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

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Detailed Syllabus:

Module no.	Module Name	Content	No of Hours
1	Introduction to Database Systems	Introduction, Characteristics of Database, File system v/s Database system, Advantages and disadvantages of database, Data abstraction, Data independence, Database users, database languages, DBMS system architecture, Database Administrator (DBA), Role of DBA	4
2	The Entity-Relationship Model	The Entity-Relationship (ER) Model, Entity and its types, Attributes and types of attributes, Relationship Types, Relationship Sets, Mapping Cardinality, ER diagram Generalization, Specialization, Aggregation, Extended Entity-Relationship (EER) Model.	4
3	Relational Model & Relational Algebra	Introduction to Relational Model, Relational Model Constraints and Relational Database Schemas, Concept of Keys: Primary Key, Secondary key, Foreign Key, Mapping the ER and EER Model to the Relational Model, Introduction to Relational Algebra, Relational Algebra Operators, Relational Algebra Queries	5
4	Structured Query Language (SQL)	Overview of SQL, Data Definition Commands, Set Operations, null values, Data Manipulation Commands, Data Control Commands, Complex Retrieval Queries using Group By, Nested queries, Integrity constraints in SQL. Security and authorization: Grant & Revoke in SQL, Aggregate functions, Hierarchical retrieval of data Functions and Procedures in SQL, cursors. Trigger and its types	7
5	Relational Database Design	Design guidelines for relational Schema, Functional Dependencies and types, Database tables and normalization, Need for normalization, Definition of Normal Forms- 1NF, 2NF, 3NF & The Boyce-Codd Normal Form (BCNF), introduction to multi valued dependency	6
6	Transaction Management, Concurrency & Recovery	Transaction concept, State Diagram, ACID Properties, Transaction Control Commands, Concurrent Executions, Serializability – Conflict and View, Concurrency Control: Lock-based-protocols, Deadlock handling Timestamp-based protocols Recovery System: Recovery Concepts, Log based recovery methods.	6
Total			30

Text Books:

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1. Korth, Silberchatz, Sudarshan, Database System Concepts, 6th Edition, McGraw Hill
2. Elmasri and Navathe, Fundamentals of Database Systems, 6th Edition, Pearson education

Reference Books:

1. Raghu Ramkrishnan and Johannes Gehrke, Database Management Systems, TMH
2. Peter Rob and Carlos Coronel, — Database Systems Design, Implementation and Management, Thomson Learning, 9th Edition.
3. SQL & PL / SQL for Oracle 11g Black Book, Dreamtech Press
4. G. K. Gupta : "Database Management Systems", McGraw – Hill

Course Name: Database Management Systems Lab

Course Code: IT07P

Category: Core

Preamble:

Database Management Systems course is intended to deliver students the elementary concepts of a database management system. It also introduces advanced level areas like transaction processing, concurrency control and recovery management.

Pre-requisites:

Structured Programming Lab (ES04P)

Course Objectives:

- To identify and define problem statements for real life applications
- To construct conceptual data model for real life applications
- To Build Relational Model from ER/EER and demonstrate usage of relational algebra.
- To Apply SQL to store and retrieve data efficiently

Course Outcomes:

Learner will be able to:

CO1: Design ER model for given real world application

CO2: Design Relational model for real world application

CO3: Write and execute DDL statements

CO4: Write and execute DML statements

CO5: Write and execute TCL statements

CO6: Design PL/SQL procedures and functions

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

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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 practicals based on the following suggested topics.

Sr No	Suggested Topic(s)
1	Identify real world problem and develop the problem statement. Design an Entity- Relationship (ER) / Extended Entity- Relationship (EER) Model.
2	Mapping ER/EER to Relational schema model.
3	Create a database using DDL and apply integrity constraints.
4	Perform data manipulations operations on populated database.
5	Perform Authorization using Grant and Revoke.
6	Implement Basic and complex SQL queries.
7	Implementation of Views and Triggers.
8	Demonstrate database connectivity using JDBC.
9	Execute TCL commands.
10	Implement functions and procedures in SQL
11	Implementation of Cursor.
12	Mini Project

Text Books:

1. SQL & PL / SQL for Oracle 11g Black Book, Dreamtech Press

Reference Books:

1. G. K. Gupta : "Database Management Systems", McGraw – Hill

Course Name: Skill Based Lab – Python

Course Code: IT08

Category: Core

Preamble:

Python is next generation multi-purpose programming language, that allows different users to create applications of various domains. Students will be able to learn primary fundamentals of python programming and potential of python is to achieve modern computing requirements.

Pre-requisites:

Object Oriented Programming (ES05T)
Object Oriented Programming Lab (ES05P)

Course Objectives:

- Acquire basic programming skills in Python.
- Understand various Object-oriented programming concepts in Python
- Understand basic python libraries

Course Outcomes:

Learner will be able to:

CO1: Demonstrate the basic concepts of python programming with the help of data types, operators and expressions, console input/output

CO2: Use various decision making statements and functions

CO3: Demonstrate operations on various builtin types like list,tuple,set and dictionary

CO4: Identify object-oriented programming constructs for developing large, modular and reusable real-time programs CO5: To create arrays and manipulate them using numpy library

CO6: Learn the fundamentals of matplotlib and pandas library

Course Scheme:

Contact Hours		Credits Assigned	
Theory	Practical	Theory	Practical
-	4	-	2

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 practical

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

Sr. No.	Suggested Topic(s)
1	Implement program to demonstrate Multithreading.
2	Implement program to demonstrate Lambda/anonymous functions.
3	Implement programs using looping constructs.
4	Implement programs using user defined functions.
5	Implement Programs to demonstrate various functions on Lists and tuples.
6	Implement programs to perform functions on Sets and dictionaries.
7	Implement programs on arrays using numpy.
8	Implement programs on basic concepts of OOP.
9	Implement programs on concept of abstract classes.
10	Implement programs using matplotlib library.
11	Implement programs using pandas library.

Reference Books:

1. James Payne, "Beginning Python: Using Python and Python 3.1,Wrox Publication
2. Dr. R. Nageswara Rao,Core Python Programming , Dreamtech Press, Wiley Publication.
3. Magnus Lie Hetland,Beginning Python From Novice to Professional, Second Edition, Apress Publication.

Detailed syllabus of courses from other baskets

Course Name: Chemistry

Course Code: BS19

Category: MDM

Preamble:

This course of Chemistry imparts the students sound knowledge on the principles of chemistry involving different application-oriented topics required in technology & engineering.

Pre-requisites:

Nil

Course Objectives:

- The contents of this course will aid in quantification and understand the applications of several concepts in Chemistry.
- To appreciate the need for and importance of engineering chemistry for industrial and domestic use.
- To gain knowledge on existing and future upcoming materials used in device fabrication.
- To impart knowledge of green chemical technology and its applications.
- To enhance the thinking capabilities in line with the modern trends in engineering and technology.

Course Outcomes:

Learner will be able:

CO1: Interpret properties, synthesis, and uses of important materials in various engineering applications.

CO2: Apply the fundamentals of electrochemistry in prevention & control measures related to corrosion of structures and devices.

CO3: Associate Green Chemistry principles in product development knowledge.

CO4: Students will be able to perform standard computational chemistry tasks.

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

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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	Engineering Materials- Nanomaterials & Composite Materials	<p>Advanced polymeric materials: Advanced polymeric materials: Conducting polymers- Polypyrrole, Polyaniline, polythiophene, (properties & applications), Light Emitting polymers (LEPs), Liquid crystal properties.</p> <p>In computers- electronics engineering materials used in computers</p> <p>Nanomaterials: Introduction, Fullerenes, Carbon nanotubes, Nanowires, Electronic and mechanical properties, Applications of nanomaterials - Catalysis, Electronics & Telecommunication, Medicines, Energy sciences.</p> <p>Composite Materials: Basics of composites, Types of Composites: Particle, Fibre, Reinforced, Structural, Real-life applications</p> <p>Smart materials: Shape Memory Alloys, piezo-electric, chromo-active, photo active materials, etc. required in computer field</p> <p>Packaging materials, Package substrates, Board fabrication</p> <p>Solder material- lead-free fabrication, Cooling- best liquid coolant, Magnets in the laptop speakers-neodymium magnets, rare earth alloys</p>	10
2	Electrochemistry, Corrosion and Corrosion Control	<p>Electrochemistry- types of electrochemical cells, Electrochemical series and Galvanic series, Numerical problems on Nernst equation</p> <p>Definition of corrosion, Direct chemical corrosion- Oxidation corrosion, Electrochemical corrosion and its mechanisms, Types of electrochemical corrosion- differential aeration, galvanic, stress, Intergranular, Microbial (soil) corrosion. Factors affecting corrosion (general factors), Protection of corrosion- anodic & cathodic protection, Coatings- Organic & Metallic,</p> <p>Applications with few practical problems of corrosion.</p> <p>Numerical problems based on Faraday's law</p> <p>Case studies like- Corrosion in electronic gadgets</p>	8
3	Chemistry of Semiconductors	<p>Silicon & Germanium - Physical and atomic properties, Isotopes, Chemistry and compounds, applications in industry. Study of compounds- GaAs, GaP, InP.</p> <p>Problems in Semiconductor industry- Shortage of semiconductors, the degradation due to corrosion, the alternative materials, reusability of the semiconductors</p> <p>Strengthening of semiconductors using chemical methods</p>	5

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Module No.	Module Name	Content	No of Hours
4	Green Chemistry	Introduction to Green Chemistry, 12 Principles of Green Chemistry	3
5	Introduction to Computational chemistry	The students are expected to write and execute at least six of the following computer programs in BASIC/Fortran/C 1. Linear regression. 2. Quadratic equation.	4
Total			30

Textbooks:

1. Shashi Chawla, "A Textbook of Engineering Chemistry", Dhanpat Rai & Co. (PVT.) LTD., New Delhi (2004).
2. S. S. Dara, "Engineering Chemistry", Chand & Co, New Delhi (2006)
3. Jain and Jain, "Engineering Chemistry", Dhanpat Rai & Co (PVT.) LTD, New Delhi (2006).

Reference Books:

1. B.R. Puri and L.R. Sharma, "Principles of Physical Chemistry", 45th Edition, Vishal Publishing Co. 2012.
2. Peter Atkins, "Physical Chemistry", XI th ed, Oxford, United Kingdom, Oxford University Press, 2017
3. V. K. Ahluwalia, "Green Chemistry: A textbook", Alpha Science International
4. J. D. Lee, "Concise Inorganic Chemistry"
5. V.R.Gowariker, "Polymer Science", New Age International Publication
6. S.K.Kulkarni, "Introduction to Nanotechnology"
7. C. N. Banwell, Elaine M. McCash, "Fundamentals of Molecular Spectroscopy", (4th edition), Tata McGraw Hill.
8. Y.R. Sharma, "Elementary Organic Spectroscopy", S. Chand and Co.
9. William D. Callister, "Materials Science and Engineering: An Introduction", Wiley
10. Mel Schwartz, "Smart Materials", CRC Press New York, 2009
11. Dimitris C. Lagoudas, "Shape Memory Alloys", Springer, New York, 2008
12. Micky Rakotondrabe, "Smart Materials- Based Actuators at Micro/Nano-Scale", Springer Science + Business Media, New York, 2013
13. Computer and Chemistry: introduction to programming and numerical methods T. R. Dickson, Freeman (1968)
14. Computer programs for chemistry D. F. Detar W. A. Benjamin Inc, New York Vol. 1-3 (1968-69)

Course Name: Biology

Course Code: BS17

Category: MDM

Preamble:

This course introduces students to virology and its related terms and concepts. It also introduces basic concepts of the nervous system, biological immune system, and computational neuroscience. This course will help the learners understand the mathematical models that are inspired from the corresponding biological models/processes and are extensively used in machine learning, deep learning, artificial immune system, computer security, artificial intelligence, etc.

Pre-requisites:

Nil

Course Objectives:

- Enable the learner to understand the concepts of virology.
- Enable the learner to understand the structure and functioning of the nervous system.
- Enable the learner to understand basics of natural immune systems.
- Enable the learner to understand basics of computational neuroscience.
- Enable the learner to understand the derivation of mathematical models from their biological counterparts.

Course Outcomes:

Learner will be able:

CO1: To develop an understanding of virology.

CO2: To understand the structure and functioning of biological nervous system.

CO3: To understand Principles of natural immune system.

CO4: To understand working principles of biological neural system.

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

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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	Virology	Virus structure and morphology. Viruses of veterinary importance. Important virus families, their replication strategies, pathogenicity and transmission of viruses. Plant viruses, plant virus propagation. Bacteriophages, bacteriophage propagation viroids	5
2	Nervous System	Neuron structure, anatomy in vertebrates: central & peripheral Nervous systems, Functions of the Nervous system: Neurons & Synapses, Neural circuits and systems, Reflexes & other stimulus response circuits, Intrinsic pattern generation	5
3	Immunology	Introduction and history; Components of Immune system: Innate & Adaptive. Primary and secondary organs of the immune system, Cells of the immune system	5
4	Computational Neuroscience-I Single Neuron Modeling	Ion flux in membranes, Nernst Planck Equation, Ion-Channels, Excitable membranes, Spiking, Hodgkin Huxley models, Integrate and Fire Neurons	5
5	Computational Neuroscience-II Neural Encoding and Decoding	Spike train statistics, Receptive fields, Linear and Nonlinear models of Receptive fields, Applications of Information Theory in neural coding and decoding	5
6	Computational Neuroscience-III Plasticity: Adaptation and Learning	Synapses: structure and function, plasticity, Spike Timing Dependent Plasticity (STDP), Learning rules, Supervised and Unsupervised Learning, Classical conditioning, Reinforcement Learning.	5
Total			30

Textbooks:

1. Fields Virology Vol 1 and 2. B.N. Fields, D.M. Knipe, P.M. Howley, R.M. Chanock, J.L. Melnick, T.P. Monath, B. Roizman, and S.E. Straus, eds.), 3rd Edition. Lippincott-Raven, Philadelphia, PA.
2. Principles of anatomy & physiology, Tortora & G.J.Derricson, J. Willey publication (15th edition)
3. Dayan, Peter, and L. F. Abbott. Theoretical Neuroscience: Computational and Mathematical Modeling of Neural Systems. Cambridge, MA: MIT Press, 2001. ISBN: 9780262041997.

Reference Books:

1. Principles of Virology: Molecular Biology, Pathogenesis, and Control of Animal Viruses. S. J. Flint, V. R. Racaniello, L. W. Enquist, V. R. Rancaniello, A. M. Skalka. Latest edition / Pub. Date: December 2003 Publisher: American Society Microbiology--- Chapters 3-13.
2. Nervous system, Columbia Encyclopedia. Columbia University Press

Course Name: Psychology

Course Code: OE33

Category: OE

Preamble:

Psychology is a science that seeks to understand behavior and mental processes and a profession that applies empirical knowledge to improve the lives of people. It is a broad discipline. Psychologists study the intersection of two critical relationships: one between brain function and behavior, and one between the environment and behavior. Because it is a scientific discipline, psychologists follow scientific methods, using careful observation, experimentation, and analysis.

This course allows students to apply knowledge about the psychological principles to understand how psychology can address and solve complex, real-world situations of the human experience, including the personal and interpersonal challenges, workplace, health, product design, law and more.

Pre-requisites: NIL

Course Objectives:

- The objective of this course is to facilitate the learners with the understanding of concepts of psychology and the cognitive processes that affect behavior, such as, motivation, emotion, problem solving, creativity, concept formation, judgement and decision making.
- It also focuses on the application of psychological principles in the effective interpersonal and group functioning, such as, communication, conflict and negotiation, leadership.
- It aims at understanding how people interact with machines and technology. Using psychological science to guide the design of products, systems and devices we use every day.

Course Outcomes:

Learner will be able to:

CO1: Increase the understanding of self and others

CO2: Overcome biases and become more empathic and understanding of others and ourselves.

CO3: Improve goal setting behavior, communication, leadership, and group functioning.

Course Scheme:

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

Assessment guidelines:

Head of Learning	ISA	Total
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Theory	100	100
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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	Foundations of Psychology	<ul style="list-style-type: none"> Introduction to psychology, historical evolution, schools of thought (behaviorism, cognitive psychology, and humanism), and research methods. 	5
2	Cognitive Processes	<ul style="list-style-type: none"> Perception, attention, memory, problem-solving, decision-making, and the role of emotions in cognition. 	6
3	Emotional Intelligence and Motivation	<ul style="list-style-type: none"> Theories of motivation (Maslow's hierarchy, self-determination theory) & Emotional intelligence in daily life. 	4
4	Social Psychology and Relationships	<ul style="list-style-type: none"> Interpersonal relationships, and conflict resolution strategies. 	6
5	Psychology in Modern Contexts	<ul style="list-style-type: none"> Workplace psychology, human-computer interaction, psychological aspects of social media, and mental health awareness in the digital age. 	5
6	Case Study Analysis	<ul style="list-style-type: none"> Application of psychological theories to real-world scenarios: interpersonal conflicts, mental health challenges, workplace dynamics, and teamwork. 	4
Total			30

Reference Books:

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1. Baron, R. A., & Kalsher, M. J. (2008). *Psychology: From Science to Practice* (2nd ed.). Pearson Education.
2. Schultz, D., & Schultz, S. E. (2010). *Psychology and Work Today* (10th ed.). Pearson Prentice Hall.
3. Matlin, M. W. (2009). *Cognition* (7th ed.). Wiley.
4. Eysenck, M. W., & Keane, M. T. (2015). *Cognitive Psychology: A Student's Handbook* (7th ed.). Psychology Press.
5. Goleman, D. (1995). *Emotional Intelligence: Why It Can Matter More Than IQ*. Bantam Books.
6. Ryan, R. M., & Deci, E. L. (2017). *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. Guilford Publications.
8. Sternberg, R. J. (2009). *Applied Cognitive Psychology: Perceiving, Learning, and Remembering*. New Delhi: Cengage Learning India.
9. Myers, D. G. (2013). *Social Psychology* (11th ed.). McGraw-Hill.
10. Aronson, E. (2011). *The Social Animal*. Worth Publishers.
11. Capuzzi, D., & Gross, D. R. (2007). *Counseling and Psychotherapy: Theories and Interventions* (4th ed.). Pearson Prentice Hall.
12. Khosrow-Pour, M. (2018). *Social Media Marketing: Breakthroughs in Research and Practice*. IGI Global.
1. Galotti, K.M. (2007). *Cognitive Psychology in and out of the Lab*. (4th ed.). Thomson Learning.
2. Goldstein, E. B. (2005). *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience*. Wadsworth/ Thomson Learning.
3. Jones, G.R., & Mathew, M. (2009). *Organisational theory, design, and change*. 5th ed., Pearson Education, Dorling Kindersley India, New Delhi.
4. Landy, F. J., & Conte, J. M. (2009). *Work In The 21st Century: An Introduction to Industrial and Organizational Psychology*, 3rd Edition Wiley-Blackwell.
5. Luthans, F. (2005). *Organizational Behavior*. (10th ed.). McGraw Hill.
6. Matthewman, L., Rose, A., & Hetherington, A. (2009). *Work Psychology: An introduction to Human Behaviour in workplace*. Oxford university press.
7. Schultz, D., & Schultz, S. E. (2010). *Psychology and Work Today* (10th ed.). Pearson Prentice Hall.
8. Singh, D. (2006). *Emotional intelligence at work: A professional guide*. 3rd ed., New Delhi, Sage publications.
9. Sternberg, R.J. (2009). *Applied Cognitive Psychology: Perceivnig, Learning, and Remembering*. New Delhi: Cengage learning India, Indian reprint 2009.
10. Robbin, Judge and Vohra (2012): *Organizational Behaviour*, ed.xiv, Pearson-Education, New Delhi.
11. Sakaran, U. (2008), *Organizational Behaviour*, TMH, N. Delhi.
12. Newstrom J W and K Davis (2010): *Organizational Behaviour: Human Behaviour at Work*, ed. v., New Delhi: TATA McGraw.
13. F. Luthans (2011): *Organizational Behaviour*, ed. vii, PHI, New Delhi.
14. Prasad L.M. (2010): *Organization Theory and Behaviour*, HPH, New Delhi.
15. Mullins L.J. (2009): *Management and Organizational Behaviour*, Pearson-Education, N. Delhi.
16. Khanna Sushama (2011): "Udai Pareek's Understanding Organizational Behaviour", revised and updated, Oxford University Press, New Delhi.
17. McShane, Glinow, Sharma: (2008): *Organizational Behaviour 4th Edition*, TATA McGraw Hill, New Delhi.
18. *Academy of Management Executive*, 16, 67–79.
19. *Academy of Management Journal*, 44, 1251–1262.
20. *Journal of Applied Psychology*, 90, 497–508.
21. *Journal of Applied Psychology*, 92, 885–892.
22. *Personnel Psychology*, 53, 625–642; Langfred, C. W. (2007).
23. *Personnel Psychology*, 46, 823–850; Magjuka, R. J., & Baldwin, T. T. (1991).

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24. Personnel Psychology, 44, 793–812; Vinokur-Kaplan, D. (1995).
25. Journal of Applied Behavioral Science, 31, 303–327.
26. Journal of Applied Psychology, 92, 1189–1199.
27. Surowiecki, J. (2005). The wisdom of crowds. New York: Anchor Books.
28. Science Quarterly, 4, 84–110; Shin, S. J., & Zhou, J. (2007).
29. Journal of Applied Psychology, 92, 1709–1721.

Course Name: Presentation Skills

Course Code: HS04

Category: HSSM_AEC

Preamble:

The course, Presentation Skills, is intended to equip students with the necessary skill-set to help them bridge the gap from the campus to the corporate world. It will help them to be industry ready in sync with the requirements of the program they are pursuing.

Pre-requisites:

Nil

Course Objectives:

- To familiarize students about constructing a personal brand effectively.
- To create engaging and deliver effective business presentation skills by utilizing digital tools.
- To apply communication and strategic planning in business plan pitches and presentations.
- To develop an appreciation for cultural diversity and enhance intercultural communication skills.
- To understand the nuances of storyboarding and storytelling
- To present oneself professionally in interviews, group discussions and various corporate situations.

Course Outcomes:

Learner will be able to:

CO1: Understand the significance of brand-building and apply strategies to construct an effective personal brand.

CO2: Demonstrate proficiency in delivering impactful presentations by utilizing digital tools and applying structured communication principles.

CO3: Proficient in crafting comprehensive business plans by employing persuasive marketing and financial strategies and implementation plans.

CO4: Craft engaging visual stories through storyboarding and storytelling, create compelling video presentations.

CO5: Demonstrate readiness for placements by gaining practice in aptitude tests, HR interviews and GDs, and crafting professional resumes.

CO6: Understand intercultural communication, global citizenship, and respect cultural diversity.

Course Scheme:

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

Assessment guidelines:

Head of Learning	ISA	MSE	ESE	Total
Practical	50	-	-	50

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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	Personal Branding	Introduction to Personal Branding –Purpose, Significance, Benefits and Techniques to build a personal brand. Corporate/Organisational Branding. Online identity of Brand on social media. Maintenance and Improvement of your Brand Factors affecting your Brand	6
2	Corporate Presentations	Business Presentation Tips Digital Presentations PAIBOC Model and Minto Pyramid Principles	4
3	Business Plan Presentations	Introduction to Business Plans Company Overview & Industry Analysis Persuasive Communication in Marketing Strategy Operations Strategy in Financial Management Implementation Plan	6
4	Storyboarding and Storytelling	Visual Story Telling Video Presentations Story Structure with images Film and Animation	4
5	Placement Readiness	Mock HR Interviews Mock GDs Aptitude Tests Placement ready resume	6
6	Global Communication	An introduction to inter-cultural communication Introduction to languages and cultures Global media in mass communication Tips to become a global citizen Respecting cultural diversity	4
Total			30

Guidelines to conduct practical sessions:

1. Personal Branding
2. Personal Branding
3. Personal Branding
4. Corporate Presentations

5. Corporate Presentations
6. Business Plan Presentations
7. Business Plan Presentations
8. Business Plan Presentations
9. Storyboarding and Storytelling
10. Storyboarding and Storytelling
11. Placement Readiness
12. Placement Readiness
13. Placement Readiness
14. Global Communication
15. Global Communication

List of Assignments:

1. Personal Branding (Individual)
2. Corporate Presentations (Group)
3. Business Plan Presentations (Group)
4. Storyboarding and Storytelling (Group)
5. Global Communication (Individual)

Recommended Online Courses:

1. Introduction to Personal Branding - <https://www.coursera.org/learn/personal-branding>
2. Strategic Self-Marketing and Personal Branding - <https://www.coursera.org/learn/self-marketing>
3. Learn to Storyboard for Film or Animation - <https://www.udemy.com/course/storyboard-for-film-or-animation/>
4. Powerful Tools for Teaching and Learning: Digital Storytelling - <https://www.coursera.org/learn/digital-storytelling>
5. Presentation Skills: Speechwriting, Slides and Delivery Specialization - <https://www.coursera.org/specializations/presentation-skills>
6. Business English for Cross-Cultural Communication - <https://www.coursera.org/learn/cross-cultural-communication-business>

Reference Books:

1. Personal Development for Life and Work, Wallace and Masters, Thomson Learning
2. Organizational Behaviour, Robbins Stephens, Pearson Education
3. Me 2.0: 4 Steps to Building Your Future, Dan Schawbel, Diversion Books
4. Branding Pays: The Five-Step System to Reinvent Your Personal Brand, Karen Kang, Branding Pays Media
5. The Presentation Secrets of Steve Jobs: How to Be Insanely Great in Front of Any Audience, Carmine Gallo, McGraw Hill Education
6. Talk Like TED: The 9 Public-Speaking Secrets of the World's Top Minds, Carmine Gallo, St. Martin's Press
7. The Storytelling Animal: How Stories Make Us Human, Jonathan Gottschall, Mariner Books
8. Made to Stick: Why Some Ideas Survive and Others Die, Chip Heath and Dan Heath, Random House
9. The Culture Map: Decoding How People Think, Lead, and Get Things Done Across Cultures, Erin Meyer, Public Affairs

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10. Kiss, Bow, or Shake Hands: The Bestselling Guide to Doing Business in More Than 60 Countries, Terri Morrison and Wayne A. Conaway, Adams Media
11. Brand Thinking and Other Noble Pursuits, Debbie Millman, Allworth
Building a Brand Story: Clarify Your Message So Customers Will Listen, Donald Miller, HarperCollins

Course Name: Indian Traditional Knowledge Systems

Course Code: GESB03

Category: 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	No. of Hours
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.	-
Total			30

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 Stewart, "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: Indian Constitution

Course Code: GEPS01

Category: 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	No. of Hours
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 State to make provision with respect to elections to such Legislature Bar to interference by Courts in electoral matters	
8	Landmark cases	Nanavati case, Shah Bano, Keshvanand Bharti Vishakha Case etc	
Total			30

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: Exploring Indian Arts

Course Code: GEA03

Category: HSSM_IKS

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	No. of Hours
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.	
Total			30

Course Name: E-waste and Environment Management

Course Code: HS05

Category: HSSM_VEC

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	-

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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. Remote sensing and GIS – Introduction and its applications in environment sector	4

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Module No.	Module Name	Content	No. of Hours
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

Category: 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	-

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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	21 st 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

Category: 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: Universal Human Values

Course Code: GESB02

Category: 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.

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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-	Human Being is more than just the Body Understanding Myself as Co-existence of the Self and the Body

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	<p>existence of Self ('I') and Body</p>	<p>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</p>
<p style="text-align: center;">4</p>	<p>Harmony in the Family, Society, Nature- Understanding Values in Human Relationships</p>	<p>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 (Sammāna) 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</p>

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

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6	Journey towards the Holistic Alternative	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: Responsibility towards sustainable environment

Course Code: GESB06

Category: 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: Four Pillars of Democratic Nation

Course Code: GEPS02

Category: 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

Category: 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.

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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

Appendix A

Exit Policy under NEP 2020 for UG Diploma

As per NEP GR dated 4th July 2023 “Students exiting the Second Year programme after securing minimum 80 credits (40 credits for DSY students) will be awarded UG Diploma 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 the skill based courses completed during the four semesters.”

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

1. Must have secured minimum of 80 credits in First and Second Year (Sem 1 to Sem 4 total credits earned). Lateral admission (DSY student) must have secured minimum of 40 credits in Second Year (Sem 3 and Sem 4 total credits).
2. Must have successfully completed all Mandatory Courses listed in the table below.
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. Students must complete the additional courses mentioned in order to choose the corresponding UG Diploma.

Mandatory Courses completed during the 4 semesters	Courses for Additional 8 credits	UG Diploma Awarded
ES04T*, ES04P*, ES05T*, ES05P*, ES10, CE01T*, IT01P*, IT04T, IT04P, IT05T and IT05P	<ul style="list-style-type: none"> • Certificate Course on Python Programming (4 Credits) • Certificate Course on Advanced Java Programming (4 Credits) 	Application Developer
ES06T*, ES06P*, ES09T*, ES09P*, IT02T, IT02P, IT07T, IT07P, CE11T and CE11P	<ul style="list-style-type: none"> • Certificate Course on Hardware Assembly (4 Credits) • Certificate course on Networking (4 Credits) 	Computer System and Network Administrator

* Exempted for lateral entry (DSY students)