Detailed Syllabus
Lab-wise Breakup

Course Code	**18B15EC313**	**Semester: Odd**	**Semester: 5th Session** 2021-2022 **Month from: June-December**
Course Name	**Embedded Systems and IOT Lab**		
Credits	1	**Contact Hours**	2 per week

Faculty (Names)	**Coordinator(s)**	Mr. Mandeep Singh Narula
	Teacher(s) (Alphabetically)	Dr. Shamim Akhtar, Dr. Gaurav Verma, Dr. Ruby Beniwal, Dr. Madhu Jain, Dr. Rachna Singh

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	**Recall** the basic of digital electronics and relate its use in microprocessors and microcontrollers.	Remembering Level (C1)
CO2	**Relate** the architecture of Microprocessors and Microcontrollers and its requirements in the area of embedded system and IOT with the help of algorithm.	Understanding Level (C2)
CO3	**Apply** the skills and proficiency in the programming to demonstrate the use of instructions in microprocessors, microcontrollers and IOT Devices.	Applying Level (C3)
CO4	**Analyze** the use of assemblers, cross compilers and real time hardware to program the microprocessors, microcontrollers, IOT boards and achieve the real time solutions to the problem.	Analyzing Level (C4)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	8085 Microprocessors	To perform addition and subtraction of two 8-bit numbers using 8085 microprocessor.	1,2,3
2.	8085 Microprocessors	To perform multiplication of two 8-bit numbers using 8085 microprocessor.	1,2,3
3.	8085 Microprocessors	To perform division of two 8-bit numbers using 8085 microprocessor.	1,2,3
4.	8085 Microprocessors	To find out the smallest & largest number in an array of 'N' 8-bit numbers using 8085 microprocessor.	1,2,3
5.	8051 Microcontrollers	Familiarization with 8051 Software Toolsthrough examples of: a. LED Blinking. b. Varying square wave generation on any pin (with and without timers).	2,4
6.	8051 Microcontrollers	Design a token display system that has a seven segment display and switches. Whenever any switch is pressed corresponding number is displayed on the segment.	3,4
7.	8051 Microcontrollers	Design a traffic light controller system that has three LEDs – RED, YELLOW, GREEN. The sequence in which the LEDs are turned on is as follows: RED for 10 count, YELLOW for 5 count, GREEN for 10 count. Interface a light-dependent resistor (LDR) to select manual and automatic mode using interrupt.	3,4
8.	8051 Microcontrollers	Display JIIT on LCD	3,4

9.	Microcontrollers	Design an IOT based system to sense the humidity and temperature using DHT11 sensor and send it to cloud.	3,4
10.	Microcontrollers	Design an IOT based system using microcontroller for controlling of home appliances using or ESP8266.	3,4

Evaluation Criteria

Components	**Maximum Marks**
Viva 1(Mid Sem Viva)	20
Viva 2(End Sem Viva)	20
Assessment Components	30
Attendance	15
Lab Record	15
Total	**100**

Project Based Learning Component: This lab teaches embedded system design using a building block approach, which allows one to visualize the requirement of an embedded system and then to design it efficiently. Learning out Embedded Systems will give the skills to design and manufacture embedded system products of the future which will help participants towards better employability. The lab will teach embedded system design using a microcontroller, namely Intel Corporation 8051 (AT89S51) microcontroller and also introduced the concept of IoT. The lab will teach IoT based system design using IoT boards, namely Arduino and ESP8266. The lab will introduce various interfacing techniques for popular input devices including sensors, output devices and communication protocols.It will also teach effective embedded programming techniques in C using Keil cross compiler. It will have a significant practical component in almost every lab exercise.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Manish k. Patel, "The 8051 Microcontroller Based Embedded Systems", 1st Edition, McGraw Hill Education, 2014.
2.	DivyahBala, ESP8266: Step by Step Tutorial for ESP8266 IOT, Arduino NodemcuDev Kit, 2018.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11EC313	**Semester** …Odd Semester **(specify Odd/Even)**	**Semester Vth, Session** 2021 -2022 **Month from August to Dec**
Course Name	Microprocessor and Microcontroller		
Credits	**3**	**Contact Hours**	

Faculty (Names)	**Coordinator(s)**	Mrs.Smriti Bhatnagar, Dr Vimal Kr. Mishra
	Teacher(s) (Alphabetically)	Dr. Gaurav Verma, Smriti Bhatnagar, Varun Goel, Dr Vimal Kr. Mishra .

COURSE OUTCOMES		**COGNITIVE LEVELS**
C330-1.1	Recall the basics of digital circuits, specifications and applications.	Remembering Level (C1)
C330-1.2	Familiarize with the basics of 8 bit, 16 bit and 32 bit microprocessor / Microcontroller, and its internal organization.	Understanding Level (C2)
C330-1.3	Use the knowledge of different instructions of 8085 microprocessor/ 8051 Microcontroller to write the various programs in assembly language.	Applying Level (C3)
C330-1.4	Interface the memory chips and peripheral chips, LED, LCD, Keyboard, Motor and Sensors with 8085 microprocessors and Micro controllers.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Digital Electronics & Microprocessor	Digital Circuit Parameters (Open collector outputs, Tristate outputs, I/O source and sink, Fan-in and Fan-out, Propagation delay, Figure of merit), Pipelining & Parallel Processing, Cache Memory, Memory Management, Virtual Memory System, Introduction to Microprocessors, Evolution of Microprocessor, Microprocessor Systems with Bus Organization, Concept of Memory & its internal Organization, Memory Expansion, Classification of Memories & their types.	6L
2.	Detailed Study of Microprocessor 8085	Features of 8085, Microprocessor Architecture in detail, Pin Diagram in detail, De-multiplexing Address & Data Bus, Generation of Control Signals, Interfacing with Memory & I/O Device with timing diagram, Instruction fetching, execution & data transfer operation, Programmer's Model & Instruction Set, Different Formats for Instruction, Opcode & Data, Addressing Modes, Complete Instruction Set (Data transfer, Arithmetic & Logical, Branch & Stack), Assembly language programming, Looping, Counting &	15L

		Indexing techniques, Interrupt System of 8085, Polling & Interrupt, Basic definition of Interrupts, Interrupt Structure & their types, Masking/Unmasking of Interrupts, Interrupt driven I/O, Microprocessor (8086, 80186, 80286, etc.), Architecture Advancement of *Programming Examples*	
3.	Detailed Study of 8051 Microcontroller	Microprocessor Versus Microcontrollers, Microcontrollers for Embedded Systems, Embedded Versus External Memory Devices, CISC Versus RISC Processors, Harvard Versus Von-Neumann architecture, 8051/8031/8052 Microcontroller (Basic architecture, Pin configuration, Memory organization (registers and I/O ports), Assembly language programming (addressing modes and instruction set), Timers and Interrupts, Serial Communication, *Programming Examples.*	12L
4.	Real World Interfacing with Microcontroller	Interfacing of single LED, Blinking of LED with timer and without timer, Interfacing of push-button, LED & 7-segment display, Intelligent LCD Display, Interfacing of intelligent LCD display, Interfacing of Matrix Keyboard to control 7-segment display, Stepper Motor & DC Motor, Interfacing with stepper & DC motor, Relay Interfacing, Different Sensor Interfacing, IR & LDR Sensor, DTMF, 8255 PPI Chip (Pin Configuration, Block Diagram, Operating Modes, Memory Mapped I/O & I/O Mapped I/O), Application of 8255 - 7 segment, Traffic Light Controller etc.	10L
		Total number of Lectures	**43 L**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Muhammad Ali Mazidi, "The 8051 microcontroller and Embedded Systems using Assembly and C", 2nd Edition, Pearson Education, 2008.
2.	R. S. Gaonkar, "Microprocessor Architecture Programming & Applications", Prentice Hall, 2002.

Detailed Syllabus

Lecture-wise Breakup

Subject Code	**17B1NEC735**	**Semester Odd**	**Semester** 5th **Session** 2021-22 **Month from** Aug 21 to Dec 21
Subject Name	**Information Theory and Applications**		
Credits	**3**	**Contact Hours**	**3**

Faculty (Names)	**Coordinator(s)**	Alok Joshi, Neetu Singh
	Teacher(s) (Alphabetically)	Alok Joshi, Neetu Singh

COURSE OUTCOMES		**COGNITIVE LEVELS**
C330-3.1	Understand the concept of probability, its relation with information, entropy, and their application in communication systems.	Understanding Level (C2)
C330-3.2	Identify theoretical and practical requirements for implementing and designing compression algorithms.	Analyzing Level (C4)
C330-3.3	Analyze the relationship between bandwidth and capacity of communication channels and its importance in real life communication systems.	Analyzing Level (C4)
C330-3.4	Analyze the need for channel coding in digital communication systems.	Analyzing Level (C4)
C330-3.5	Generate error correcting codes for error detection and correction.	Analyzing Level (C4)

Module No.	**title of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Review of Basic Probability	Probability spaces. Random variables. Distributions and densities. Functions of random variables. Statistical Averages. Inequalities of Markov and Chebyshev. Weak law of large numbers.	3
2.	Information Measure	Discrete entropy. Joint and conditional entropies. Entropy in the continuous case. Maximization of continuous entropy. Entropy of a bandlimited white Gaussian process.	5
3.	Data Compression	Uniquely decipherable and instantaneous codes. Kraft- McMillan inequality. Noiseless coding theorem. Construction of optimal codes.	4
4.	Data Transmission	Discrete memoryless channel. Mutual information and channel capacity. Shannon's fundamental theorem and its weak converse. Capacity of a bandlimited AWGN channel. Limits to communication – Shannon limit.	5
5.	Error Control Coding	Coding for reliable digital transmission and storage. Types of codes. Modulation and coding. ML decoding. Performance measures.	3
6.	Linear Block Codes	Algebra Background, Groups, Fields, Binary field arithmetic. Vector Spaces over GF(2). Generator and parity check matrices. Syndrome and error detection. Standard array and	8

		syndrome decoding. Hamming codes.	
7.	Cyclic Codes	Polynomial representation, Systematic encoding. Cyclic encoding, Syndrome decoding.	6
8.	Convolutional Codes	Generator Sequences. Structural properties. Convolutional encoders. Optimal decoding of convolutional codes- the Viterbi algorithm.	8
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance, Performance. Assignment/Quiz)
Total	**100**

Project Based Learning: Students will learn about the design and implementation of compression algorithms as well as error-correcting codes with the help of assignments. Additionally, students in group sizes of two-three will prepare a review on any one application of Information Theory**.**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	R.B. ASH: Information Theory, Dover, 1990.
2.	R. BOSE: Information theory, coding and cryptography, Mcgraw Hill 2016.
3.	R.W. YEUNG: Information Theory and Network Coding, Springer, 2010.
4.	S. LIN & D.J. COSTELLO: Error Control Coding, 2nd Edn, Pearson, 2011.
5.	T.K. MOON: Error Correction Coding, Wiley, 2006.

Detailed Syllabus
Lecture-wise Breakup

Course Code	18B11EC312	**Semester** Odd **(specify Odd/Even)**	**Semester** 5th **Session** 2021 -2022 **Month from** September-December
Course Name	Electromagnetic Field Theory		
Credits	4	**Contact Hours**	3+1

Faculty (Names)	**Coordinator(s)**	Ashish Gupta, Monika
	Teacher(s) (Alphabetically)	Ashish Gupta, K. Nisha, Monika, Raghvenda Kumar Singh, Reema Budhiraja,

COURSE OUTCOMES		**COGNITIVE LEVELS**
C312.1	Recall concepts of vector calculus to solve complex problems and relate among different coordinate systems. Explain the basic principles of electrostatics and magnetostatics and relate the electric and magnetic fields using Maxwell's Equations.	Understanding Level (C2)
C312.2	Illustrate the propagation of electromagnetic waves in different medium and their reflection and transmission parameters. Distinguish among different wave polarizations.	Applying Level (C3)
C312.3	Estimate the current, voltage and power for the different types of transmission lines, determine reflection parameters. Demonstrate the Waveguide theory, Wave equations, and evaluate different waveguide parameters.	Evaluating Level (C5)
C312.4	Classify and compare the different parameters associated with the antenna and also interpret the radiation mechanism.	Understanding Level (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introductory material	Review of scalar, vector fields and coordinate systems (cylindrical and spherical coordinate) Electrostatic and Magneto static Fields	8
2.	Maxwell's Equations	Inconsistency of Amperes law, Continuity equation, Displacement current, Maxwell's equations, Boundary conditions.	4
3.	Electromagnetic Waves	Wave propagation in free space, Conductors and dielectrics, Polarization, Plane wave propagation in conducting and non conducting media, Phase velocity, Group velocity; Reflection at the surface of the conductive medium, Surface Impedance, Depth of penetration.	11
4.	Poynting Vector and Power	Poynting theorem, Poynting Vectors and power loss in a plane conductor.	2
5.	Transmission Lines	Transmission line equations, characteristic impedance, open and short circuited lines, standing wave and reflection losses. Impedance matching.	7
6.	Wave guides	Rectangular wave guides Modes in rectangular coordinates, characteristics, power transmission and losses.	6
7.	Radiation and Antennas	Scalar and vector potentials. Radiation from a current filament, Antenna characterstics, radiation pattern, radiation	4

		intensity, directivity and power gain.	
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Project Based Learning: Students will learn to derive the wave equations of waveguide which will help them to design the rectangular waveguide for any operating frequency in the X-Band. They will be also able to conduct different experiments based on the waveguide and subsequently design on the EDA tools such as HFSS. They will also study the different antenna parameters which will enable them for design various kind of Antennas on EDA Tools. It will make them enable to make different projects to cope up with the current challenges.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	M.N.O. Sadiku, S.V. Kulkarni, *Principles of Electromagnetics*, Oxford Press, 6th Edition, 2016.
2.	W. H. Haytt, J.A. Buck, M. J. Akhtar, *Engineering Electromagnetics*, McGraw Hill Education, 8th Edition, 2014.
3.	S. Salivahanan, S. Karthie, *Electromagnetic Field Theory*, McGraw-Hill Education, 2nd Edition, 2019.
4.	C.A. Balanis, Advanced Electromagnetics, Wiley Publishers, 2nd Edition, 2012.
5.	S.C. Mahapatra, S. Mahapatra, *Principles of Electromagnetic*, McGraw Hill Education, 2nd Edition, 2015.
6.	A.R. Harish, M.Sachidananda, aAntennas and Wave Propagation, Oxford University Press, 2015.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15EC312	**Semester Odd (specify Odd/Even)**	**Semester 5th Session 2021-22 Month from July to December**
Course Name	Electromagnetic Field Theory Lab		
Credits	**1**	**Contact Hours**	**2**

Faculty (Names)	**Coordinator(s)**	K.Nisha, Raghvenda Singh
	Teacher(s) (Alphabetically)	Bhagirath Sahu, Neetu Joshi, Raghvenda Kumar Singh, Reema Budhiraja, Vishal Narain Saxena, Monika, Neetu Singh, K.Nisha, Ashish Gupta.

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	To observe electromagnetic wave propagation in X-band waveguide and draw the dispersion curves. To simulate a rectangular waveguide and calculate its cut-off frequency.	Understanding Level (C2)
CO2	Calculate and evaluate the various parameters such as VSWR and load impedance of transmission lines.	Applying Level (C3)
CO3	Measure the microwave power in Gunn oscillator, directional coupler and also measure the radiation patterns of the antenna.	Evaluating Level (C5)
CO4	Design and simulate the different antenna parameters using HFSS software and verify with the measured results.	Creating Level (C6)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Rectangular Waveguide Parameters	Study, Design and Modelling of the Rectangular Waveguide on ANSYS Electronics Desktop 2019.	**1**
2.	Rectangular Waveguide Parameters	Plot the different parameters of the designed Rectangular Waveguide and optimize with the help of parametric study for the designed Rectangular Waveguide on ANSYS Electronics Desktop 2019.	**2**
3.	Microstrip-feed Rectangular Microstrip Antenna	Study, Design and Modelling of the Microstrip-feed Rectangular Microstrip Antenna on ANSYS Electronics Desktop 2019.	**4**
4.	Microstrip-feed Rectangular Microstrip Antenna	Plot the different parameters of the designed antenna and optimize with the help of parametric study for the designed Rectangular Microstrip Antenna on ANSYS Electronics Desktop 2019.	**4**

5.	Dipole Antenna	Study, Design and Modelling of the Half-Wavelength Dipole Antenna using High Frequency Structure Simulator (HFSS).	**4**
6.	Dipole Antenna	Plot the different antenna parameters of the designed dipole antenna and optimize with the help of parametric optimization using ANSYS Electronics Desktop 2019.	**4**
7.	I-V characteristics of a Gunn-Diode	To study Gunn Oscillator as a source of microwave power and hence to study and plot its I –V characteristics. Gun diode	**3**
8.	Rectangular waveguide	To determine the frequency and wavelength in a rectangular waveguide working in TE10 mode.	**3**
9.	Rectangular waveguide	Determine experimentally the broader dimension of rectangular waveguide using microwave test bench at X-band of microwave frequency.	**1**
10.	Measurement	Determine experimentally the propagation characteristics of following microwave devices operating at X-band using microwave test bench a. Directional coupler or b. Magic Tee.	**3**
11.	Radiation Pattern	To plot and study the radiation pattern of Dipole and Yagi antenna.	**3**
12.	Measurement of Input parameters of the antenna	Measurement of Input parameters of an Antenna using Vector Network Analyzer.	**4**

Evaluation Criteria

Components	**Maximum Marks**
Viva 1(Mid Sem Viva)	20
Viva 2(End Sem Viva)	20
Assessment Components	30
Attendance	15
Lab Record	15
Total	**100**

Project Based Learning: Students will learn to design a rectangular waveguide for a given frequency range and to study the configuration of Electric and Magnetic waves. They can also analyze the different modes for a given rectangular waveguide and operating frequency. They designed microstrip and dipole antenna. They understood parameters optimization of dipole antenna to get good band width.

They will be able to operate and characterize different microwave devices such as Gunn Diode, Directional Coupler, magic tee etc. Students can also plot and measure the radiation patterns of the given antennas. Most importantly students will be able to simulate and characterize the designed antennas and waveguides with the help of ANSYS Electronics Desktop 2019 tool. After designing and subsequent fabrication, antennas can be measured using vector network analyzer available in the lab. Thus, students can make different projects by using the knowledge gained from the mentioned experiments.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	M.N.O. Sadiku, S.V. Kulkarni, *Principles of Electromagnetics*, Oxford Press, 6th Edition, 2016.
2.	C.A. Balanis, Advanced Electromagnetics, Wiley Publishers, 2nd Edition, 2012.
3.	A.R. Harish, M.Sachidananda, aAntennas and Wave Propagation, Oxford University Press, 2015.

Detailed Syllabus

Lab-wise Breakup

Course Code	18B15EC314	**Semester Odd (specify Odd/Even)**	**Semester** 5th **Session** 2021 -2022 **Month from** July - Dec
Course Name	Python for Signal processing and Communication		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Jyoti Vyas, Vivek Dwivedi
	Teacher(s) (Alphabetically)	B. Suresh, Neetu Singh, Kapil Dev Tyagi, Parul Arora, Pankaj Kumar Yadav,

COURSE OUTCOMES: At the completion of the course, students will be able to:		**COGNITIVE LEVELS**
C310. 1	Understand applications of Python in signal processing and communication.	Understanding Level (C2)
C310.3	Apply Python for implementing signal operations and transformations on images.	Applying Level (C3)
C310.4	Analyze the different blocks of communication systems using Python.	Analyzing Level (C4)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction to Python	Introduction to Python and its various applications.	C310.1
2.	Signals	Generating Continuous and Discrete time signals.	C310.1
3.	DT Convolution	To calculate the convolution sum of two discrete time signals.	C310.2
4.	Signal Transformations	Writing codes to compute DFT (Discrete Fourier Transform) and IDFT (Inverse Discrete Fourier Transform) for the spectral analysis of signals.	C310.2
5.	Signal Operations	Writing codes for generating various signal operations.	C310.2
6.	Data Wrangling	To transform raw data to a clean and organized format ready for use.	C310.1
7.	Image Data	To read, write, display and explore image data.	C310.3
8.	Image Enhancement	To perform image enhancement in spatial domain.	C310.3
9.	Sampling	Analysis of sampling techniques.	C310.4
10.	Pulse Code Modulation	To perform pulse code modulation and demodulation.	C310.4
11.	Digital Modulation Techniques	Analysis of digital modulation techniques.	C310.4
12	Linear and Logistic Regression	To implement Linear Regression for prediction and Logistics Regression for classification.	C310.2
13.	Virtual Lab 1	To learn file operations in Python	C310.1
14.	Virtual Lab 2	To learn the concepts of Constructor and Inheritance in Python programming language. To implement those concepts in solving a simple problem in the simulator.	C310.1
Evaluation Criteria			

Components	Maximum Marks
Viva 1(Mid Sem Viva)	20
Viva 2(End Sem Viva)	20
Assessment Components	30
Attendance and Discipline	15
Virtual Lab	05
Report	10
Total	**100**

Project based learning: Students will implement SVMs for image classification using standard image classification dataset. Additionally, students in group sizes of two-three will realize any one application of machine learning using Python programming.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	J. UNPINGC310.: Python for Signal Processing, Springer International Publishing Switzerland, 2014.
2.	M. WICKERT: Signal Processing and Communications: Teaching and Research Using IPython Notebook, In Proc. of the 14th python in science conf., (scipy. 2015).
3.	B. P. LATHI: Modern Digital and Analog Communication System: Python textbook Companion, Oxford University Press Inc.

Detailed Syllabus
Lab-wise Breakup

Course Code	15B19EC591	**Semester** Odd **(specify Odd/Even)**	**Semester:** 5th **Session:** 2021 -2022 **Month:** September 21- December 21
Course Name	Minor Project - I		
Credits	2	**Contact Hours**	NA

Faculty (Names)	**Coordinator(s)**	Mr. Ankur Bhardwaj, Mr. Raghvenda Kumar Singh
	Teacher(s) (Alphabetically)	Mr. Ankur Bhardwaj, Mr. Raghvenda Kumar Singh

COURSE OUTCOMES: At the completion of the course, students will be able to:		**COGNITIVE LEVELS**
C350.1	Identifying, planning and initiation of the individual projects in the domain selected by them, respectively.	Applying Level (C3)
C350.2	Analyze the potential research areas in the field of Embedded Systems, Signal Processing, VLSI, Communication, Artificial Intelligence and Machine Learning/Deep Learning etc.	Analysing Level (C4)
C350.3	Survey the available literature and gain knowledge of the State-of-Art in the chosen field of study.	Analysing Level (C4)
C350.4	Evaluate the existing algorithms of the domain selected and improvise the algorithm so that it yields better results than the existing metrics.	Evaluating Level (C5)
C350.5	Design and implement a working model, using various hardware components, which works as a prototype to showcase the idea selected for implementation.	Creating Level (C6)

Evaluation Criteria

Components	**Maximum Marks**
Viva 1(Mid Sem Viva)	20
Day-to-Day Mid	20
Viva 2(End Sem Viva)	20
Day-to-Day Final	20
Report	20
Total	**100**

Evaluation scheme for different assessment components (AC's),

MID Evaluation:

1. AC1 (Literature Survey)
2. AC2 (Problem Identification)
3. AC3 (Technical Soundness)
4. AC4 (Presentation)

Final Evaluation:

1. AC1(Methodology)
2. AC2 (Implementation/ Coding and Result Analysis)
3. AC3 (Technical Soundness)
4. AC4 (Presentation)

Report:

1. AC1(Literature Review),
2. AC2 (Language and Formatting)
3. AC3 (Technical Correctness)

Detailed Syllabus
Lecture-wise Breakup

Subject Code	15B11CI518	**Semester:** Odd	**Semester:** V **Session:** 2021 -2022 **Month from:** Sep 2021 to Dec 2021
Subject Name	Data Structures & Algorithms		
Credits	3	**Contact Hours**	3-0-0

Faculty (Names)	**Coordinator(s)**	Bhawna Saxena (J62), Rupesh K. Koshariya (J128)
	Teacher(s) (Alphabetically)	Bhawna Saxena, Deepti, K. Vimal Kumar, Rupesh K. Koshariya, Shruti Jaiswal

COURSE OUTCOMES		**COGNITIVE LEVELS**
C311.1	Apply fundamental operations on data structures such as linked-lists, trees, binary search trees, AVL trees, heap trees, graphs, and hash-tables.	Applying Level (C3)
C311.2	Analyze and compare different sorting algorithms - Merge Sort, Quick sort, Shell sort and Bucket Sort.	Analyzing Level (C4)
C311.3	Identify suitable data structure and develop solution for the given problem.	Applying Level (C3)
C311.4	Formulate solutions for programming problems or improve existing code using algorithms such as, Backtracking, Branch and Bound, Greedy algorithm and Dynamic programming.	Applying Level (C3)

Module No.	**Subtitle of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction to data structures, lists, Doubly linked list, circular linked list, multi linked list, Applications - sparse matrix representation, Stack and queue (array and linked list representation)	8
2.	Algorithm Complexity	Abstract data type, Growth of function, Space-Time tradeoffs, Complexity analysis of algorithms - Asymptotic analysis	2
3.	Sorting & Searching	Merge Sort, Quick sort, Shell sort, Bucket Sort, Median search, Interpolation search	6
4.	Trees	Binary Tree, Binary Search tree, AVL Tree, B Tree, B+ Tree	7
5.	Heaps	Introduction to heaps, Binary heap	2
6.	Graph	Introduction to graphs, Representation – adjacency list, adjacency matrix, Traversal – BFS, DFS, Minimum spanning tree – Prims and Kruskal's algorithm	4
7.	Hashing	Introduction to hashing, Collision resolution – open and closed hashing methods	3
8.	Algorithm	Introduction to Backtracking Algorithm, Branch and Bound, Greedy algorithm, Problems on Greedy algorithm (0-1 Knapsack), Dynamic programming, Problems on Dynamic Programming (Fractional Knapsack, Longest Common Subsequence) Graph Algorithms- Shortest path usingDijkstra algorithm and Floyd–Warshall algorithm	10

Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance (10), Mini-Project (5), Tutorial (5) Quiz (5))
Total	**100**

Project based leaning: Groups of 2-3 students will choose a project topic. They will use the concepts of DSA to execute their project. In a team, they will learn how to apply the concepts for problem solving in a meaningful way. The knowledge gained will enhance their employability in the IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

	Text Books
1.	Data Structures and Algorithms in C++, Adam Drozdek, Cengage Learning; 4th edition (2012)
2.	Data Structures and Algorithms Made Easy, by Narasimha Karumanchi, Career Monk Publications; 5th edition (2016)
3.	An Introduction to Data Structures with Application, by Jean-Paul Tremblay , Paul Sorenson, McGraw Hill Education; 2 edition (2017)
	Reference Books
1	YedidyahLangsam, Moshe J., Augenstein and Aaron M. Tenenbaum: Data Structures Using C and C++, 2nd Edition, PHI, 2001
2.	Kurt Mehlhorn: Data Structures and Algorithms 3, Springer, 1984
3	Dinesh P Mehta, SartajSahani: Handbook of Data Structure and Applications, Chapman & Hall, 2004
4	Sahni: Data Structures, Algorithms and applications in C++, Universities press, Hyderabad, 2005
5	Kruse, Tonso, Leung: Data Structures and Program Design in C, 2rd Edition, Pearson Education Asia, 2002
6	Weiss, Mark Allen: Data Structures and Algorithm Analysis in C/C++, 2nd Edition, Pearson Education Asia, 2003
7	Cormen et al: Introduction to Computer Algorithms, 2nd edition , PHI New Delhi 2003
8	Aho, Hopcraft, Ullman: Data Structures and Algorithms, Pearson Education Asia (Adisson Wesley), New Delhi, 2001
9	Standish: Data Structures in Java, Pearson Education Asia (Adisson Wesley), New Delhi, 2000
10	Knuth: The Art of Computer programming Vol I, Vol III, 2nd edition , Pearson Education Asia (Adisson Wesley), New Delhi, 2002

Detailed Syllabus

Subject Code	15B17CI578	**Semester:** ODD **(Specify Odd/Even)**	**Semester 5 Session** 2021-2022 **Month from** Aug'21 **to** Dec'21
Subject Name	Data Structures & Algorithms Lab		
Credits	0-0-1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Shradha Porwal, Shruti Jaiswal
	Teacher(s) (Alphabetically)	Ankita Wadhwa , Bhawna Saxena, Deepti Singh, K Vimal Kumar, Rupesh Khosariya, Shardha Porwal, Shruti Jaiswal

COURSE OUTCOMES		**COGNITIVE LEVELS**
C371.1	Demonstrate the use of basic data structure and algorithm design such as Linked lists, Stacks, Queues, and others, for various applications.	Understanding Level (C2)
C371.2	Interpret the complexity of algorithms for given problems.	Understanding Level (C2)
C371.3	Apply Searching, Sorting, and Trees and use their properties for abstractions and defining modules for implementing functionalities.	Apply Level (C3)
C371.4	Examine case-study specific application of Heaps, Graphs, and Hashing methods.	Apply Level (C3)
C371.5	Model algorithmic solutions for small real-life problems using Backtracking, Greedy algorithm and Dynamic programming, Branch and Bound, and others	Apply Level (C3)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction & Algorithm Complexity	**Lab Assignment 1:** Conversion from one number system to another; Manipulation with arrays and strings, structures; **Lab Assignment 2 and 3:** Manipulation with a single Linked lists of integers; **Lab Assignment 4:** Stacks and Queues Finding Complexity: Big O, Big Omega Cost Analysis	CO1, CO2, Understanding Level (C2)

2.	Sorting, Searching & Trees	**Lab Assignments 2 and 3:** Doubly Linked List, Circular Linked List **Lab Assignments 4:** Multi-Linked Lists **Lab Assignments 5 and 6**: Sorting, Searching, Application based. **Lab Assignments 7, 8, 9**: Binary Tree, Binary Search Trees, AVL Tree , Case-study: Priority Queue with Binary Trees, B Trees	CO1 Understanding Level (C2) CO3 Apply Level (C3)
3.	Heaps, Graph	**Lab Assignments 10:** Heaps **Lab Assignment 11 and 12**: Directed and undirected graphs, weighted graphs, etc.	CO4 Apply Level (C3)
4.	Hashing & other Algorithms	**Lab Assignments 13:** Hashing, Backtracking, Branch and Bound, Greedy Algorithms, Dynamic Programming.	CO5 Apply Level (C3)

Evaluation Criteria

Components	**Maximum Marks**
Lab Test 1	20
Lab Test 2	20
Day-to-Day Evaluations	15
Mini-Project	15
Day-to-Day - Attendance	15
Assignment	15
Total	**100**

Project Based Learning: The students in a group of 3- 4 are required to submit a project based on either real-world data or a real-time application. For the data or application chosen, the students need to analyze appropriate data structure for the arrangement of data so that it can be accessed and worked on with specific algorithms more effectively. Selecting the appropriate setting for your data is an integral part of the programming and problem-solving process. Data structures organize abstract data types in concrete implementations. To attain that result, they make use of various algorithms, such as sorting, searching, etc. The project typically incorporates various data structure concepts to enable the synthesis of knowledge from real-life experiences.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1	Data Structures and Algorithms in C++, Adam Drozdek, Cengage Learning; 4th edition (2012)
2	Data Structures and Algorithms Made Easy, by Narasimha Karumanchi, CareerMonk Publications; 5th edition (2016)
3	An Introduction to Data Structures with Application, by Jean-Paul Tremblay , Paul Sorenson, McGraw Hill Education; 2 edition (2017)

4	Yedidyah Langsam, Moshe J., Augenstein and Aaron M. Tenenbaum: Data Structures Using C and C++, 2nd Edition, PHI, 2001
5	Kurt Mehlhorn: Data Structures and Algorithms 3, Springer, 1984
6	Dinesh P Mehta, Sartaj Sahani: Handbook of Data Structure and Applications, Chapman & Hall, 2004
7	Mark Allen Weiss: Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson
8	Sahni: Data Structures, Algorithms and applications in C++, Universities press, Hyderabad, 2005
9	Kruse, Tonso, Leung: Data Structures and Program Design in C, 2rd Edition, Pearson Education Asia, 2002
10	Weiss, Mark Allen: Data Structures and Algorithm Analysis in C/C++, 2nd Edition, Pearson Education Asia, 2003
11	Cormen et al: Introduction to Computer Algorithms, 2nd edition , PHI New Delhi 2003
12	Aho, Hopcraft, Ullman: Data Structures and Algorithms, Pearson Education Asia (Adisson Wesley), New Delhi, 2001
13	Standish: Data Structures in Java, Pearson Education Asia (Adisson Wesley), New Delhi, 2000
14	Knuth: The Art of Computer programming Vol I, Vol III, 2nd edition , Pearson Education Asia (Adisson Wesley), New Delhi, 2002
15	Heileman: Data Structures, Algorithms and Object Oriented Programming, Tata Mc-Graw Hill, New Delhi, 2002
16	Sorenson and Tremblay: An Introduction to Data Structures with Algorithms, 2nd Edition, Tata Mc-Graw Hill, New Delhi, 2003

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS433**	**Semester: Odd**	**Semester: Session** 2021-2022 **Month from: August to Dec**
Course Name	Financial Management		
Credits	3	**Contact Hours**	3 (3-0-0)

Faculty (Names)	**Coordinator(s)**	Dr. Sakshi Varshney, Dr. Shirin Alavi
	Teacher(s) (Alphabetically)	Dr. Sakshi Varshney, Dr. Shirin Alavi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-3.1	Understand the fundamental concepts of Financial Management and Analyze the time value of money in taking investment decisions.	Analyzing Level (C4)
C303-3.2	Contrast the various forms of business organizations, evaluate the sources of funds and measure their financial performance through ratio analysis.	Evaluating Level (C5)
C303-3.3	Evaluate investment projects using capital budgeting techniques.	Evaluating Level (C5)
C303-3.4	Apply the concept of cost of capital into evaluation of investment projects	Applying Level (C3)
C303-3.5	Evaluate the leverage capacity of a business and its application in selection of Longterm sources of finance.	Evaluating Level (C5)
C303-3.6	Understand the practical considerations for managing working capital requirementin a firm.	Understanding Level (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Basic financial concepts-Meaning of Accounting, Accounting Concepts and Conventions, Introduction to Double Entry system and Accounting equation, Definition and Objectives of Financial management,	4
2.	Time value of Money	Compounding, Discounting, Annuity, Perpetuity, Loan Amortization	5
3.	Analysis of Financial Statements	Understanding of Balance Sheet and Income Statements, Ratio Analysis, Interpretation, Importance and limitations	5
4.	Capital Budgeting: Principle Techniques	Nature of Capital Budgeting, Evaluation Techniques: Discounting (NPV, IRR etc.) and Non-discounting Techniques (payback, ARR etc)	6
5.	Long Term Sources of Finance	Definition, types, advantages and disadvantages	4
6.	Concept and measurement of cost of capital	Definition, measurement of specific costs, computation of Overall Cost of Capital,	5
7.	Cash Flows for Capital Budgeting	Identification and determination of relevant cash flows	5

8.	Leverages and Capital structure decision and Working Capital Management	Break Even Analysis, Operating, Financial and combined leverage, Capital structure EBIT- EPS analysis, Concept ofworkingcapitalmanagement,PracticalConsiderations in Working capital management, Evils of Excess or Inadequate Working Capital, Cash Management – Receivables Management – Inventory Management	8
		Total number of Lectures	**42**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project+ Quiz+ Class participation)
Total	**100**

Project based learning: Each student in a group of 4-5 will opt a company which is listed in at least one of the stock exchanges of India.To make subject application based, the students analyze latest financial data and other information of last two years of chosen company by the financial tool of Ratio analysis and use this financial data for decision making. UnderstandingBalance Sheet and financial statements of the business firm enhances the student's knowledgeon organisational structure of the firm and financial analysis helps theiremployability into financial sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Chandra, P., *Financial Management Theory and Practice*, 7th ed., Tata McGraw Hill, 2007.
2.	Horne, J.C.V. and Wachowicz, J.M. Fundamentals of Financial Management, 13th ed., Pearson Publication, 2009. Accessed online: https://wps.pearsoned.co.uk/ema_uk_he_wachowicz_fundfinm an_13/106/27149/6950308.cw/-/6950310/index.html
3.	Khan, M.Y. and Jain, P.K. Financial Management: Text, Problems and Cases, 8th ed., McGraw Hill Education, 2019.
4.	Kishore, R.M., *Financial Management*, 6th ed, Taxmann, 2007.
5.	Mukherjee,M and Hanif.M., Financial accounting, 8th ed., Tata McGraw Hill,2008.
6.	Pandey, I.M., Financial management, 11th ed, Vikas Publishing House Pvt Ltd, 2015

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Detailed Syllabus
Lecture-wise Breakup

Subject Code	**19B12HS311**	**Semester: ODD**	**Semester V Session 2021-22** **Month from July to December**
Subject Name	**ENTREPRENEURSHIP DEVELOPMENT**		
Credits	**3**	**Contact Hours**	**3(3-0-0)**

Faculty (Names)	**Coordinator(s)**	**Dr Badri Bajaj**
	Teacher(s) (Alphabetically)	**Dr Badri Bajaj**

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-8.1	Understand basic aspects of establishing a business in a competitive environment	Understand Level (C2)
C303-8.2	Apply the basic understanding to examine the existing business ventures	Apply Level (C3)
C303-8.3	Examine various business considerations such as marketing, financial and teaming etc.	Analyze Level (C4)
C303-8.4	Assessing strategies for planning a business venture	Evaluate Level (C5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Entrepreneurial perspective	Foundation, Nature and development of entrepreneurship, importance of entrepreneurs, Entrepreneurial Mind, Individual entrepreneur Types of entrepreneurs, Entrepreneurship in India	8
2.	Beginning Considerations	Creativity and developing business ideas; Creating and starting the venture; Building a competitive advantage; Opportunity recognition, Opportunity assessment; Legal issues	14
3.	Developing Marketing Plans	Developing a powerful Marketing Plan, E-commerce, Integrated Marketing Communications	6
4.	Developing Financial Plans	Sources of Funds, Managing Cash Flow, Creating a successful Financial Plan Developing a business plan	11
5.	Leading Considerations	Developing Team, Inviting candidates to join team, Leadership model	3
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Project , Class Participation, Attendance)
Total	**100**

Project based learning: Each student in a group of 4-5 will work on developing business plan around a new idea. They will include the major business consideration in the plan. The students will present the business plans. Discussions on these practical issues will enhance students' understanding of entrepreneurship. The students will learn from other groups as well through other groups' presentations.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Robert D Hisrich, Michael P Peters & Dean A Shepherd, "Entrepreneurship" 10th Edition, McGraw Hill Education, 2018
2.	Norman M. Scarborough and Jeffery R. cornwell, "Essentials of entrepreneurship and small business management" 8th Edition, Pearson, 2016
3.	Rajiv Roy, "Entrepreneurship", 2nd Edition, Oxford University Press, 2011
4.	Sangeeta Sharma, "Entrepreneurship Development", 1st Edition, Prentice-Hall India, 2016
5.	John Mullins, "The New Business Road Test: What entrepreneurs and investors should do before launching a lean start-up" 5th Edition, Pearson Education, 2017

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NPH531	**Semester : ODD**	**Semester: 5th** **Month from July to December**
Course Name	**Quantum Mechanics for Engineers**		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Anuraj Panwar
	Teacher(s) (Alphabetically)	Anuraj Panwar

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-10.1	Remember basics of Quantum Mechanics and its applications.	Remembering (C1)
C301-10.2	Explain postulates of quantum mechanics, Dirac notation, Schrödinger Equation, Perturbation theory and Qubits.	Understanding (C2)
C301-10.3	Solve various problems related to different quantum systems and construct quantum circuits using quantum gates.	Applying (C3)
C301-10.4	Analyse the results obtained for various physical systems and to establish the advantages of some simple protocols of quantum information processing.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Wave particle duality, quantum physics (Planck and Einstein's ideas of quantized light), postulates of quantum mechanics, time dependent and time independent Schrodinger equation, operators, probability theory, expectation values, and uncertainty principle and its implications, no cloning applications	8
2.	Measurement Theory with	Matrix and linear algebra, Eigen values and eigenfunctions Hilbert space, Kets, Bras and Operators, Bras Kets and Matrix representations, Measurements, Stern Gerlach Experiment,	10

	Applications	Observables and Uncertainity Relations, No-cloning theorem, Pauli Spin Matrices.	
3.	Potential problems	1-D, 2-D, and 3-D potential problems (including infinite and finite square well). Tunneling, harmonic oscillator, separation in spherical polar coordinates, hydrogen atom, etc.),	08
4.	Approximatio n methods	Time independent perturbation theory for nondegenerate and degenerate energy levels.	4
5.	Advanced Applications	Kronig Penny model, Basic ideas of quantum computing, Qubit, Gate model of quantum computing : H, CNOT, Pauli Gates, BB84 protocol, Advantages of quantum computing, Quantum wire, Quantum dot and realization of CNOT using Quantum dot.	10
		Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [Attendance (07 M), Class Test, Quizzes, *etc*(07 M), Assignments in PBL mode (06 M), and Internal assessment (05 M)]
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	The new quantum universe by Toney Hey and Patrick Walters, Cambridge University Press.
2.	Quantum mechanics a new introduction by Kenichi Konishi and G Paffuti, OUP., 2009
3.	Quantum physics by Eyvind H Wichman (Berkeley Physics course Vol 4) Tata McGraw Hill 2008
4.	Elements of quantum computation and quantum communication by A Pathak, CRC Press 2013.
5.	Introduction to Quantum Mechanics by David J. Griffiths, Second Edition, Pearson, 2015.

Project Based Learning: Students may do projects on various applications of quantum mechanics like quantum computing and quantum information. This will help them apply theory learnt to more advanced problems in quantum mechanics. This should help students develop research-based learning which is very important in emerging technologies like quantum computing and information**.**

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH532	**Semester**: ODD	**Semester: 5th Session:** 2021 -2022 **Month from July 21 to December 21**
Course Name	Materials Science		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Manoj Kumar and Sandeep Chhoker
	Teacher(s) (Alphabetically)	Manoj Kumar and Sandeep Chhoker

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-11.1	Recall variety of engineering materials for their applications in contemporary devices	Remembering (C1)
C301-11.2	Explain dielectric, optical, magnetic, superconducting, polymer and thermoelectric properties	Understanding (C2)
C301-11.3	Apply properties of dielectric, optical, magnetic, superconducting, polymer and thermoelectric materials to solve related problems	Applying (C3)
C301-11.5	Prove and estimate solution of numerical problems using physical and mathematical concepts involved with various materials	Evaluating (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Dielectric Materials	Polarization mechanism & Dielectric Constant, Behavior of polarization under impulse and frequency switching, Dielectric loss, Spontaneous polarization, Ferroelectrics, Piezoelectric effect; Applications of Dielectric Materials	10
2.	Optical Materials	Basic Concepts, Light interactions with solids, Optical properties of nonmetals: refraction, reflection, absorption, Beer-Lambert law, transmission, Photoconductivity. Drude Model, relation between refractive index and relative dielectric constant, Optical absorption in metals, insulators and semiconductors. Introduction to Photonic band gap (PBG) materials and its applications	**6**
3.	Magnetic Materials	Concept of magnetism, Classification – dia-, para-, ferro-, antiferro- and ferri-magnetic materials, Their properties and Applications; Hysteresis; Magnetic Storage and Surfaces.	**10**
4.	Super conducting Materials	Meissner effect, Critical field, type-I and type-II superconductors; Field penetration and London equation; BCS Theory, High temperature Superconductors and their Applications	**5**
5.	Polymers and Ceramics	Various types of Polymers and their applications; Mechanical behavior of Polymers, synthesis of polymers; Structure, Types, Properties and Applications of Ceramics; Mechanical behavior and Processing of Ceramics.	**6**
6.	Thermoelectric Materials	Thermoelectric (TE) effects and coefficients (Seebeck, Peltier, Thompson); TE materials and devices, Heat conduction, Cooling,	**3**

		Figure of Merit; TE power generation (efficiency), refrigeration (COP), Examples and applications.	
		Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [Quiz/class test (7), attendance (7), PBL assignment (6) and teacher assessment (5)]
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	S.O. Pillai, Solid State Physics, New Age International Publishers.
2.	B. B. Laud, Laser and Non-linear Optics, John Wiley & Sons
3.	Van Vlack, Elements of Material Science and Engineering, Pearson Education.
4.	Srivastava and Srinivasan, Material Science and Engineering,
5	W.D. Callister Jr., Material Science and Engineering: An Introduction, John Wiley.

Project Based Learning: Students will make application oriented individual projects on selected material (dielectric, magnetic, superconducting, optical and Thermoelectric etc.) depending on its suitability for advanced application such as medical diagnostic, sensing (pertaining to current pandemic situation) and similar. Each project will envisage the material properties, the working principles, advantages and disadvantages of that specific material as well as the possible advancement from the literature. This will be a group project and students will work in a group of 3-4 students. This project will make them prepared for industry jobs in the material industry or for higher studies in similar fields.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH533	**Semester** Odd **(specify Odd/Even)**	**Semester** 5th **Session** 2021-2022 **Month from** July to December
Course Name	Laser Technology and Applications		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Navneet Kumar Sharma, Anshu D. Varshney
	Teacher(s) (Alphabetically)	Anshu D. Varshney, Navneet Kumar Sharma

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-12.1	Define the coherent properties, high brightness of laser, population inversion and optical feedback to laser technology	Remembering Level (C1)
C301-12.2	Extend the knowledge of lasers in some applications like LIDAR, laser tracking, bar code scanner, lasers in medicine and lasers in industry	Understanding Level (C2)
C301-12.3	Apply the optical ray transfer matrix to determine the stability of a laser resonator	Applying Level (C3)
C301-12.4	Distinguish the operational principles of CW, Q-switched, mode locked lasers; laser rate equations for three & four level lasers; different types of laser systems	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Fundamentals of Lasers	Laser idea and properties; Monochromaticity, directionality, brightness, Temporal and spatial Coherence. Interaction of radiation with matter; Absorption, spontaneous and stimulated emission of radiation, Rates equations, Einstein's A and B coefficients. Laser rate equations: Four level and three level systems. Conditions for producing laser action, population inversion, saturation intensity, threshold condition and gain optimization. Experimental techniques to characterize laser beam.	12
2.	Types of Lasers	Pumping processes; optical and electrical pumping. Optical Resonators; The quality factor, transverse and longitudinal mode selection; Q switching and Mode locking in lasers. Confocal, planar and spherical resonator systems. Types of Lasers; Solid state Lasers; Ruby Laser, Nd:YAG laser. Gas lasers; He-Ne laser, Argon laser, CO_2, N_2 and Excimer Laser. Dye (liquid) Laser, Chemical laser (HF), Semiconductor Lasers; Heterostructure Lasers, Quantum well Lasers. Free electron laser, X-ray laser and Ultrafast Laser.	16
3.	Applications of Lasers	Image processing; Spatial frequency filtering and Holography, Laser induced fusion; Fusion reactor, creation of Plasma. Lightwave communications. Use in optical reader (CD player) and writer. Nonlinear optics; harmonic generation, self focusing. Lasers in industry; Material processing, Cutting, welding and whole drilling. Precision	12

		length measurement, velocity measurement, Laser Tracking, Metrology and LIDAR. Lasers in medicines and surgery. Lasers in defense, Lasers in space sciences, Lasers in sensors.	
			Total number of Lectures **40**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [Attendance (07 M), Class Test, Quizzes, *etc* (07 M), Assignments in PBL mode (06 M), and Internal assessment (05 M)]
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Thyagarajan and Ghatak, *Lasers Theory and Applications*, Macmilan India.
2.	W. T. Silfvast, *Laser Fundmentals*, Cambridge Univ-Press.
3.	O. Svelto, *Principles of Lasers*, Springer.
4.	Saleh and Teich, *Fundamentals of Photonics*, John Wiley & Sons.

Project based learning: Each student in a group of 4-5 students will opt a topic and will do the theoretical study in detail. The students will submit their report. To make the subject application based, the students analyze the optical fiber applications, holography applications and use of photons in memory devices. This shall improve the skills and employability of the students in laser and photonic industries.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH535	**Semester: ODD**	**Semester: 5th Session: 2021-22** **Month from July 2021 to December 2021**
Course Name	NUCLEAR SCIENCE AND ENGINEERING		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Dr. Manoj Tripathi
	Teacher(s) (Alphabetically)	Dr. Manoj Tripathi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-14.1	Relate terminology and concepts of nuclear science with various natural phenomenon and engineering applications.	Remembering (C1)
C301-14.2	Explain various nuclear phenomenon, nuclear models, mass spectrometers, nuclear detectors, particle accelerators. and classify elementary particles.	Understanding (C2)
C301-14.3	Solve mathematical problems for various nuclear phenomenon and nuclear devices.	Applying (C3)
C301-14.4	Analyze the results obtained for various physical problems and draw inferences from the results.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Nuclear Constituents and their properties, Nuclear Forces	Rutherford scattering and estimation of nuclear size, Constituents of the nucleus and their properties, Nuclear Spin, Moments and statistics, Magnetic dipole moment, Electric quadruple moment. Nuclear forces, Two body problem - Ground state of deuteron, Central and non-central forces, Exchange forces: Meson theory, Yukawa potential, Nucleon-nucleon scattering, Low energy n-p scattering, Effective range theory, Spin dependence, charge independence and charge symmetry of nuclear forces, Isospin formalism.	07
2.	Nuclear Models	Binding energies of nuclei, Liquid drop model: Semi-empirical mass formula, Mass parabolas, Prediction of Nuclear stability, Bohr-Wheeler theory of fission, Shell model, Spin-orbit coupling. Magic numbers, Angular momenta and parities of nuclear ground state, Magnetic	05

		moments and Schmidt lines, Collective model of a nucleus.	
3.	Nuclear decay and Nuclear reactions	Alpha decay, Beta decay, Pauli's Neutrino hypothesis-Helicity of neutrino, Theory of electron capture, Non-conservation of parity, Fermi's theory, Gamma decay: Internal conversion, Multipole transitions in nuclei, Nuclear isomerism, Artificial radioactivity, Nuclear reactions and conservation laws, Q-value equation, Centre of mass frame in nuclear Physics, Scattering and reaction cross sections, compound nucleus, Breit-Wigner one level formula	08
4.	Interaction of nuclear radiation with matter	Interaction of charge particles with matters: Bohr's ionization loss formula and estimation of charge, mass and energy. Interaction of electromagnetic radiation with matter, Linear absorption coefficient. Nuclear particle detectors and neutron counters.	07
5.	Accelerator and reactor Physics	Different types of reactors, tracer techniques, activation analysis. Radiation induced effects and their applications: Accelerators: Linear accelerators, Van de Graff generator, LINAC, Cyclotrons, Synchrotons, Colliders.	06
6.	Cosmic radiation and Elementary Particles	Cosmic radiation: Discovery of cosmic radiation, its sources and composition, Latitude effect, altitude effect and east-west asymmetry, secondary cosmic rays, cosmic ray shower, variation of cosmic intensity and Van Allen radiation belt. Elementary particles: Classification of particles, K-mesons, Hyperons, particles and antiparticles, fundamental interactions, conservation laws, CPT theorem, resonance particles and hypernucleus, Quark model.	07
		Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [Attendance (07 M), Class Test, Quizzes, *etc* (07 M), Assignments in PBL mode (06 M), and Internal assessment (05 M)]
Total	**100**

Project Base Learning	Different groups of students with 5-6 students in each group may be formed and these groups may be given to complete a task like identifying common applications to nuclear science, recent developments in nuclear science, etc. The students may be asked to make presentations on topics like radioactive dating or nuclear models and their applications. Devices like linear accelerators, cyclotrons etc. may also be included. The students

	may also be asked to study the recent developments in nuclear science/ engineering and present them.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	K.S. Krane, 1987, Introductory Nuclear Physics, Wiley, New York.
2.	I. Kaplan, 1989, Nuclear Physics, 2nd Edition, Narosa, New Delhi.
3.	B.L. Cohen, 1971, Concepts of Nuclear Physics, TMH, New Delhi.
4.	R.R. Roy and B.P. Nigam, 1983, Nuclear Physics, New Age International, New Delhi.
5.	H.A. Enge, 1975, Introduction to Nuclear Physics, Addison Wesle, London.
6.	Y.R. Waghmare, 1981, Introductory Nuclear Physics, Oxford-IBH, New Delhi.
7.	R.D. Evans, 1955, Atomic Nucleus, McGraw-Hill, New York.

Course Description

Course Code	16B1NMA531	**Semester** Odd	**Semester** V **Session** 2021-22 **Month from** Aug 2021- Dec 2021
Course Name	Discrete Mathematics		
Credits	3	**Contact Hours**	3-0-0
Faculty (Names)	**Coordinator(s)**	Dr. Vipin Chandra Dubey	
	Teacher(s) (Alphabetically)	Dr. Vipin Chandra Dubey	

COURSE OUTCOMES: After the successful completion of this course, the student will be able to		**COGNITIVE LEVELS**
C301-1.1	explain partial order relations, Hasse diagram, lattices and recursive functions.	Understanding Level (C2)
C301-1.2	solve the difference equations using generating function and Z-transform.	Applying Level (C3)
C301-1.3	explain the propositional and predicate calculus to check the validity of arguments.	Understanding Level (C2)
C301-1.4	demonstrate graphs, digraphs, trees and use it to solve the different problems of graph theory.	Applying Level (C3)
C301-1.5	illustrate various algebraic structures and their properties.	Understanding Level (C2)
C301-1.6	explain the theory of formal languages and solve the related problems of automata.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Relations and Lattices	Relations and their composition. Pictorial representation, matrix and graphical representations. Equivalence relations and partitions. Partial ordered relations and Hasse diagram. Lattices.	5
2.	Functions	Functions and Recursively defined functions, generating functions, solution of recurrence relations by generating function. Z transforms, solution of difference equations by Z transform.	8
3.	Propositional Calculus	Propositions- simple and compound. Basic logical operators. Implication. Truth tables. Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers.	4
4.	Graphs	Graphs and related definitions, subgraphs, isomorphism, paths and connectivity. Eulerian graph and Konigsberg problem. Hamiltonian graph. Labelled and weighted graphs. Tree Graphs- Minimum spanning Tree (Prim's algorithm). Graph colorings. Four color problem.	7
5.	Directed Graphs	Trees, Digraphs and related definitions. Rooted trees. Algebraic expressions and Polish notation. Sequential representation. Adjacency matrix. Path matrix.	5

		Shortest path. Linked representation of directed graphs. Binary trees.	
6.	Algebraic Structures	Groups- definitions and examples, order of elements, subgroup, condition for subgroups. Quotient groups, Lagrange theorem and applications, Rings, integral domains and Fields- definition and examples.	7
7.	Languages and Grammars	Strings (words) and languages, grammars, types of grammars, Finite state machines, finite state automata, regular languages and regular expressions.	6
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials, PBL)
Total	**100**

Recommended Reading material:

1.	**Lipschutz, S. and Lipson**, M., Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1997.
2.	**Rosen, K. H.,** Discrete Mathematics and its Application, 7th Edition, Tata McGraw-Hill, 2011.
3.	**Liu, C. L**., Elements of Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1998.
4.	**Kolman, B., Busby, R. C. and Ross, S.,** Discrete Mathematical Structures, 6th Edition, Prentice Hall, 2018.
5.	**Deo, N.,** Graph Theory, Prentice Hall, 2004.
6.	**Grimaldi, R.P.,** Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2011.

Detailed Syllabus

Course Code	16B1NMA533	**Semester** - Odd **(specify Odd/Even)**	**Semester** 5th **Session** 2021 -2022 **Month from** July 2021 - Dec 2021
Course Name	Matrix Computations		
Credits	4	**Contact Hours**	3+1

Faculty (Names)	**Coordinator(s)**	Dr. Amita Bhagat and Dr. Neha Singhal
	Teacher(s) (Alphabetically)	Dr. Amita Bhagat, Dr. Neha Singhal, Dr. Pato Kumari

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-3.1	explain the basics of matrix algebra and inverse of a matrix by partitioning.	Understanding level (C2)
C301-3.2	solve the system of linear equations using direct and iterative methods.	Applying Level (C3)
C301-3.3	explain the vector spaces and their dimensions, inner product space, norm of a vector and matrix.	Understanding level (C2)
C301-3.4	apply the Gram-Schmidt process to construct orthonormal basis and Q-R decomposition of a matrix.	Applying Level (C3)
C301-3.5	construct Gershgorin's circles and solve eigenvalue problem using Jacobi, Givens, Housholder, power and inverse power methods.	Applying Level (C3)
C301-3.6	analyze systems of differential and difference equations arising in dynamical systems using matrix calculus.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Matrix Algebra	Review of matrices, partitioning, block diagonal matrix, elementary matrices, Inverse of a matrix by partitioning.	6
2.	Linear System of equations	Existence and uniqueness of solution for system of linear equations. LU decomposition, Crout's and Doolittle's method, Cholesky factorization. Gauss Siedel, Gauss Jacobi and partial pivoting.	6
3.	Vector and Inner Product Spaces	Vector spaces, Subspaces, dimension and basis, *p*-norms of vector, Inner product, Norm using inner product and norms of a matrix.	6
5.	Orthogonality	Orthogonal and orthonormal sets, Gram-Schmidt process, QR factorization.	4

4.	Eigen value Problems	Eigen values and Eigenvectors, spectral radius, Greshgorin's theorem, Jacobi method, Givens rotations method and Householder's method, Power and Inverse power methods, Q-R algorithm.	12
6.	Matrix Calculus	Powers and functions of matrices, application to solve discrete dynamical systems $x(t+1) = Ax(t)$, $x(0) = \alpha$ and a system of differential equations of the form $dx/dt = Ax$, $x(0) = \alpha$.	8
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignments, Quizzes and Tutorial)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	**Bronson, R**., Matrix Methods an Introduction, Academic Press, 1991.
2.	**Golub, G. H., Loan, C. F. V.,** Matrix Computations, 4th Edition, Johns Hopkins University Press, 2013.
3.	**Datta, K. B.**, Matrix and Linear Algebra, 3rd Edition, Prentice Hall of India, 2016.
4.	**David, W. Lewis**., Matrix Theory, World Scientific, 1991.

Detailed Syllabus
Lecture-wise Breakup

Subject Code	16B1NHS434	**Semester :ODD**	**Semester VSession 2021-22** **August - December**
Subject Name	**Introduction to Contemporary Form of Literature**		
Credits	**3**	**Contact Hours**	**3 (3-0-0)**

Faculty (Names)	**Coordinator(s)**	**Dr Monali Bhattacharya (Sector 62) Dr Ekta Srivastava (Sector 128)**
	Teacher(s) (Alphabetically)	**Dr. Ekta Srivastava & Dr Monali Bhattacharya**

Course Outcomes:

	Course Outcome	**COGNITIVE LEVELS**
C303-6.1	Interpret & relate with the genres, periods, and conventional as well as experimental forms of literature as current ethical, technological and cultural reflections of society.	CL-2 Understand
C303-6.2	Apply literary and linguistic theories on the texts to identify them as cultural constructs inculcating human values in the society.	CL-3 Apply
C303-6.3	Analyze select representative texts of different cultures thematically and stylistically.	CL-4 Analyse
C303-6.4	Determine the reciprocal relationship between the individual and culture individually and/or through a research-based paper/poster presentation.	CL-5 Evaluate
C303-6.5	Create literary, non-literary write-up with proper applied grammar usage, individually and in a team.	CL-6 Create

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Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Hours for the module**
1.	**Introducing Literary Theories**	• From Formalism to Reader Response Theory: Major Terms & Concepts • Narrative Art & Narratology • Language & Style: An Introduction	12

2.	**Introducing New Forms & Sub Genres Today: Features & Portions**	• New Fiction: Graphic Novels, Cyberpunk • Non Fiction: Memoirs & Autobiographies, Biographies	4
3.	**Modern Retellings/ Childeren's Literature**	*Cinderella* (Poem) - Roald Dahl	3
4.	**European Lit./Travel/ Memoir/ Spiritual Literature**	*Eat, Pray & Love (Travelogue& cinematic adaptation)*	4
5.	**Written Communication Through Non-Fiction**	*Personal Narratives (Diary, Blog, Memoirs, Travelogue)*	4
6.	**Commonwealth / Indian Literature**	*Hayavadana(Short Play)*- Girish Karnad	4
7.	**Afro-American Lit/ Post Colonial Literature**	*Sweetness (Short Story)* – Toni Morrison	3
8	**Sci-fi (Cyberpunk)**	*Neuromancer (Science Fiction) – William Gibson*	4
9	**Canadian Literature/ Speculative Fiction**	*The Penelopiad- Margaret Atwood*	4
		Total number of Hours	**42**

Project Based Learning: Students are supposed to write Personal Narrative: Memoir or a Blog (of 2 pages) keeping transition markers, stylistic and linguistic devices in mind, thereafter, submit it to preassigned peer, who reviews it and writes a biographical note of the writer, based on stylistic choices made by him/her in blog and memoir. Students also are required to submit an entire project having components of Research Paper (analyzing mythical text of one's choice), Comparative Analysis of his/her work with Penelopiad or Hayavadana in Digital Poster Format & Report on Online Collaboration

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Project, Class Interaction)
Total	**100**

Recommended Reading material:

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	M.H. Abrams, 'A Glossary of Literary Terms'.7th Edition, Hienle&Hienle: Thomson Learning, USA, 1999. For online version:

	https://mthoyibi.files.wordpress.com/2011/05/a-glossary-of-literary-terms-7th-ed_m-h-abrams-1999.pdf
2.	Mark William Roche, 'Why Literature matters in the 21st Century', 1st Edition, Yale University Press, 2004.
3	https://allpoetry.com/poem/8503199-Cinderella-by-Roald-Dahl Online video version: https://www.youtube.com/watch?v=dLmNG5EbHvc. An interview with Dahl: https://www.youtube.com/watch?v=pA7kUPStmPE
4	Elizabeth Gilbert, 'Eat, Pray & Love. 1st Edition, Penguin,US, 2006. For online version: http://mrs-sullivan.com/wp-content/uploads/Eat-Pray-Love-Book-on-pdf.pdf An interview with Elizabeth :https://www.youtube.com/watch?v=m9B9zFo4RFw
5	William Zinsser, 'On Writing Well: The Classic Guide to Writing Nonfiction', Harper Perennial; 30th Anniversary ed. Edition, 2016 For Online version: http://richardcolby.net/writ2000/wp-content/uploads/2017/09/On-Writing-Well-30th-Anniversa-Zinsser-William.pdf
6	Girish Karnad, 'Hayavadana', 1st Edition, Oxford University Press, Delhi, 1975 (30th Impression, 2012). For online version: https://pdfcoffee.com/hayavadana-girish-karnadpdf-pdf-free.html An interview with Karnad: https://www.youtube.com/watch?v=laL7oWWuLGI
7	https://www.newyorker.com/magazine/2015/02/09/sweetness-2 Audio version: https://www.youtube.com/watch?v=ltKXTZTBmPs. An interview with Morrison: https://www.youtube.com/watch?v=DQ0mMjII22I&list=RDDQ0mMjII22I&start_radio=1&rv=DQ0mMjII22I&t=107
8	William Gibson, 'Neuromancer', 1st Edition, The Berkley Publishing Group, New York, 1984. For online version http://index-of.es/Varios-2/Neuromancer.pdf
9	Margaret Atwood, 'The Penelopiad', 1st Edition, Canongate Series, Knopf, Canada, 2005. For online version: https://www.langhamtheatre.ca/wp- content/uploads/2010/09/The-Penelopiad.pdf An interview with Atwood: https://www.youtube.com/watch?v=D5Wj_JQ6NhY

Detailed Syllabus
Lecture-wise Breakup

Subject Code	**16B1NHS435**	**Semester : ODD**	**Semester: V Session: 2021-2022** **Month: August to December**
Subject Name	**SOCIOLOGY OF MEDIA**		
Credits	**3**	**Contact Hours**	**(3-0-0)**

Faculty (Names)	**Coordinator(s)**	**Dr. Priyanka Chhapariya**
	Teacher(s) (Alphabetically)	**Dr. Priyanka Chhapariya** **Shikha Kumari**

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C303-2.1	Demonstrate a basic understanding of different concepts used in the systematic study of Sociology of Media	Understanding(C 2)
C303-2.2	Examine various sociological theoretical orientations towards media and society.	Analyzing(C 4)
C303-2.3	Analyze the key issues related to the processes of Production of Media, Popular Culture and consumer culture.	Analyzing(C 4)
C303-2.4	Critically evaluate the Cultural Consumption, Social Class & the process of construction of subjectivities and audience reception in new Media	Evaluating(C 5)
C303-2.5	Create positive and critical attitude towards the use of new media and understanding of threats of Digital Age	Creating(C 6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Introduction to the Course	1
2.	Theoretical Orientation	• Functionalist Approach to the Sociology of Media and Popular Culture • Critical Approach to the Sociology of Media and Popular Culture • Symbolic Interactionist Approach to the Sociology of Media and Popular Culture • Different theories of Media	8
3.	Concept of Popular Culture and its critical analysis	• What is popular culture? • Difference between 'pop' culture and 'high' culture • What distinguishes popular culture from other kinds of culture (art, folk culture)? Is there a distinction at all anymore? • Visualizing Society through 'pop' culture/ media • Risks and rituals that come with Popular Culture	8
4.	New media	• Difference between tradition media and new media • New media as technology • New Information Technology (brief history in case of India)	5
5.		• Mediatization of Society	5

	Media & State	• Free-speech Media	
6.	Consumption of Media and Media reception	• Social Actors as Audience/ Audience as market– Theory • Media effects: Media and representations (gender, ethnic)- the under-representation and misrepresentation of subordinate groups. • Media and the construction of reality: media logic and cultivation analysis theory • Information Society vs Informed Society • Cultural Consumption and Social Class	9
7.	Media in Global Age	• Rise of Network Society- Manuel Castells • Global Media: impact of market & state • Global Perspectives: The world on our doorstep • Marketing and aesthetics in everyday life	7
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Presentation and attendance)
Total	**100**

Project Based Learning- Each student will review research papers applying assumptions of different media theories studies in the course and submit a project.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	JosephTurow, *Media Today: An Introduction to Mass Communication*,3rd Ed., Taylor & Francis. UK. (2008).
2.	JA Fisher 'High Art v/s Low Art, in Berys Nigel Gaut& Dominic Lopes (eds.), *The Routledge Companion to Aesthetics*. Routledge2001
3.	G.Ritzer, 'McDonaldization of Society,. *The Journal of American Culture*. Volume 6, Issue 1. (2001 [1983])Pp. 100-107.
4.	Manuel. Castells,'Introduction', in *Rise of Network Society: The Information Age: Economy, Society and Culture*, 2nd Ed (1996).

Detailed Syllabus
Lecture-wise Breakup

Course Code	**20B13HS311**	**Semester: Odd**	**Semester: V Session: 2021-22** **Month: August-December**
Course Name	**Indian Constitution and Traditional Knowledge**		
Credits	**3**	**Contact Hours**	**3-0-0**

Faculty (Names)	**Coordinator(s)**	Dr. Chandrima Chaudhuri
	Teacher(s) (Alphabetically)	• Dr. Chandrima Chaudhuri • Dr. Niti Mittal • Dr. Praveen Sharma • Dr. Swati Sharma

CO Code	**COURSE OUTCOMES**	**COGNITIVE LEVELS**
C305.1	Demonstrate an understanding about the early Indian traditional political thought and the constitutional design by knowing about the structure of government in place	Understand (C2)
C305.2	Demonstrate an understanding of the role of Indian President, Prime Minister, Governor, other members of the legislaturein their mutual interaction and local governments as representatives of the common masses	Understand (C2)
C305.3	Analyze the working of Indian federalism with reference to centre-state relations	Analyze (C4)
C305.4	Analyze the impact of the contemporary challenges such as caste and gender to the working of Indian democracy	Analyze (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	The Indian Constitution	• Historical Background to the Indian Constitution • Salient features of the Indian Constitution • Fundamental Rights (Part III of the Indian Constitution) • Fundamental Duties (Part IVA of the Indian Constitution) • Directive Principles of the State Policy (Part IV of the Indian Constitution) • Amendments to the constitution	8
2.	Organs of the Government	• The Executive: President, Prime Minister and Governor- appointment, powers and functions	8

		• The Legislature: Parliament and its components- Lok Sabha and Rajya Sabha (composition and functions) • The Judiciary: Supreme Court-composition, functions, appointment and jurisdiction	
3.	Nature of Federalism in India	• Centre-State Legislative Relations • Centre-State Administrative Relations • Centre-State Financial Relations • Special Provisions of some state and the 5^{th} and 6^{th} schedule • Emergency provisions	8
4.	Local Governance in India	• Urban local governance: Municipality- Structure & Functions • Rural Local governance: Panchayat- Organization and Powers • Civil Society: the participation of the people in local governance	8
5.	Traditional knowledge	• Kautilya- Theory of state • Mandala theory • Saptanga theory	6
6.	Challenges to Indian Democracy	• Caste as a critical factor in the Indian Constitution • Gender as critical to the process of Constutionalization	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance, Quiz, Project)
Total	**100**

Project: Projects based on important Supreme Court judgments have to be submitted by the students as a part of the project-based learning method. This would help the students to know about the interpretation of the various rights done by Supreme Court which would help them in their workplace as well as in general life.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	A.A. George, *Important Judgements that transformed India*, New Delhi: McGraw Hill, 2020
2.	B. Chakraborty, *Indian Constitution: Text, Context and Interpretation*, New Delhi: Sage Publications, 2017
3.	B.K.Sharma, *Introduction to the Constitution of India*, New Delhi: Prentice Hall of India, 2002
4.	M.Laxmikanth, *Indian Polity*, 6th edition, Noida: McGraw Hill, 2019
5.	M.P.Singh and R. Saxena, R, *Indian Politics: Contemporary Issues and Concerns*, New Delhi: PHI Learning, 2008
6.	R. Kangle, *Arthashashtra of Kautilya*, New Delhi: Motilal Publishers, 1997
7.	Videos- Samvidhan series produced by Rajya Sabha Television .https://www.youtube.com/watch?v=0U9KDQnIsNk

Detailed Syllabus
Lecture-wise Breakup

Course Code	21B12HS312	Semester: Odd (specify Odd/Even)	Semester: 5th Session: 2021 -2022 Month from: August-December
Course Name	**Management Accounting**		
Credits	03	Contact Hours	3-0-0

Faculty (Names)	Coordinator(s)	Dr. Mukta Mani
	Teacher(s) (Alphabetically)	Dr. Mukta Mani

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-10.1	To understand and analyse the financial statements of a business organization	Analyze (C4)
C303-10.2	To apply cost concepts and cost-volume-profit analysis in decision making	Apply (C3)
C303-10.3	To understand the concepts of cost management and apply activity-based costing	Apply (C3)
C303-10.4	To analyse relevant information for decision making	Analyze (C4)
C303-10.5	To apply the concepts of accounting for planning and control	Apply (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Basic Accounting	Concepts, Techniques and Conventions	4
2.	Understanding and analysing financial statements	Balance sheet, Income statement, statement of changes in stockholders' equity, statement of cash flows, Use of ratios for analysis	6
3.	Introduction to Management accounting	Management Accounting in service organizations, Management Process and accounting, Ethical conduct for accountants	4
4.	Introduction to cost behaviour	Identifying resources, Activities, Costs and Cost drivers; Variable and Fixed cost behaviour; Cost-Volume-Profit Analysis	4

5.	Measurement of Cost behaviour	Cost drivers, Management influence on cost behaviour, Cost functions	3
5.	Cost Management Systems and Activity-Based costing	Direct, Indirect cost; Cost allocation; Traditional and Activity Based costing systems	4
6.	Relevant information for decision making	Relevant information for Pricing decisions and operational decisions	7
6.	Budgetary Control	Introduction to budgets; Functional budgets, Master budget, Fixed and flexible budgets, Budgets as financial planning models	4
7.	Standard Costing and Variance analysis	Standard costing system, Variance analysis	3
8.	Management control systems and responsibility accounting	Management control system, Organizational goals, controllability and measurement of financial performance, measures of profitability, ROI or Economic profit	3
Total number of Lectures			**42**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (assignments, class test, project)
Total	**100**

Project based learning-The students will be given a group project to identify a simple business, one with at-least two product, two services or one product & one service. They will estimate the fixed and variable costs related to the business and carry-out Cost-Volume-Profit analysis to determine the Break-even sales of the business. Also, they will determine the cost of products/services using Activity based Costing. Lastly the students will prepare projected master budget for next three years which include the sales budget, operating expenses budget, cash budget, purchase budget, projected balance sheet, profit and loss account and so on.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Charles T. Horngren, Gary L. Sundem, Jeff O. Schatzberg, Dave Burgstahler, Introduction to Management Accounting, 16th Edition, Pearson Publication, 2014.
2.	Anthony A. Atkinson, Robert S. Kaplan, Ella Mae Matsumura, S. Mark Young, G. Arun Kumar,

	Management Accounting, 5th Edition, Pearson Publication, 2009.
3.	Arora, M.N. Cost and Management Accounting, Himalaya Publishing, 4th Edition, 2018.
4.	Hingorani, Ramanathan and Grewal, Management Accounting, S. Chand Publications, 2003.