Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11EC313	**Semester** …Odd Semester **(specify Odd/Even)**	**Semester Vth, Session** 2024 -2025 **Month:** July to Dec
Course Name	Microprocessors and Microcontrollers		
Credits	**3**	**Contact Hours**	**3**

Faculty (Names)	**Coordinator(s)**	Shradha Saxena and Vimal Kumar Mishra
	Teacher(s) (Alphabetically)	Rachna Singh, Shradha Saxena and Vimal Kumar Mishra

UPDATED COURSE OUTCOMES		**COGNITIVE LEVELS**
C330-1.1	Remember the basics of digital integrated circuits, data processing, memory organization, and microprocessor system.	**C1** (Remembering Level)
C330-1.2	Understand the basics, internal organization and instructions set of 8085 microprocesslor, and its interfacing with memory and Input/output devices.	**C2** (Understanding Level)
C330-1.3	Apply the knowledge of different instructions of 8085 microprocessor/8051 microcontrollers to write the various assembly language program	**C3** (Applying Level)
C330-1.4	Evaluate the performance of 8085 microprocessor/ 8051 Microcontroller on the basis of delay analysis using timing diagram	C4 (Evaluating Level)
C330-1.5	Analyze the interfacing of 8051 Microcontroller with different input/output devices such as LED, LCD, Keyboard, Motor and Sensors.	C5 (Analyzing Level)

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	15L

		& Instruction Set, Different Formats for Instruction, Opcode & Data, Addressing Modes, Complete Instruction Set (Data transfer, Arithmetic & Logical, Branch & Stack), Assembly language programming, Looping, Counting & 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**

Project Based Learning: In these students will learn to interface different peripheral to microcontroller / microprocessor like LCD and seven segment display, Which are used in different projects for displaying information like counts, Traffic Light Controller etc .

Interfacing of DC Motors, relay and stepper Motor help the students to integrate different Robotic Applications.

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** 2024-25 **Month from** July to December
Subject Name	**Information Theory and Applications**		
Credits	**3**	**Contact Hours**	**3**

Faculty (Names)	**Coordinator(s)**	Bajrang Bansal, Richa Gupta
	Teacher(s) (Alphabetically)	Bajrang Bansal, Richa Gupta

COURSE OUTCOMES		**COGNITIVE LEVELS**
C330-3.1	Recall basic concepts of random variables and probability theory.	Remembering Level (C1)
C330-3.2	Understand the principles of information theory in communication systems. Also, learn relationship between bandwidth and capacity of communication channels	Understanding Level (C2)
C330-3.3	Apply various types of lossless codes to improve efficiency of information. Also, learn how to apply cyclic and convolutional codes in a communication system.	Applying Level (C3)
C330-3.4	Analyze the need of channel coding in digital communication systems. Also, develop the skills to generate Linear Block codes and analyse their performance.	Analysing 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 syndrome decoding. Hamming codes.	8

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 data compression algorithms as well as error-correcting codes with the help of assignments. Using MATLAB the covered topics can be utilized for project too.

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** 2024 -2025 **Month from** July-December
Course Name	Electromagnetic Field Theory		
Credits	4	**Contact Hours**	3+1

Faculty (Names)	**Coordinator(s)**	Raghvenda Kumar Singh, Reema Budhiraja
	Teacher(s) (Alphabetically)	Ashish Gupta, Joysmita Chatterjee, Monika, Vishal Narayan Saxena

COURSE OUTCOMES At the end of the course, students will be able to:		**COGNITIVE LEVELS**
C312.1	Recall concepts of vector calculus and different coordinate systems.	Remembering Level (C1)
C312.2	Understand the basic principles of electrostatics and magnetostatics and relate the electric and magnetic fields using Maxwell's equations.	Understanding Level (C2)
C312.3	Apply the concepts of electrostatics and magnetostatics to study the propagation characteristics of electromagnetic waves in different media.	Applying Level (C3)
C312.4	Analyze the parameters and propagation characteristics of transmission lines and waveguides.	Analyzing Level (C4)
C312.5	Evaluate the different parameters associated with the antenna and also interpret the radiation mechanism.	Evaluating Level (C5)

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 Ampere's 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 vector 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 waveguide modes in rectangular coordinates, characteristics, power transmission and losses.	6
7.	Radiation and Antennas	Scalar and vector potentials. Radiation from a current filament, Antenna characteristics, radiation pattern, radiation intensity, directivity and power gain.	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
Test1	20
Test2	20
End Semester Examination	35
Teachers Assessment	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 also be 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 to design various kinds of Antennas on EDA Tools. It will enable them 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, Antennas and Wave Propagation, Oxford University Press, 2015.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15EC312	**Semester:** Odd	**Semester:** V **Session:** 2024-25 **Month:** July-December
Course Name	Electromagnetic Field Theory Lab		
Credits	**1**	**Contact Hours**	**2**

Faculty (Names)	**Coordinator(s)**	Joysmita Chatterjee (JIIT 62), Raghvenda Kumar Singh (JIIT 128)
	Teacher(s) (Alphabetically)	Ashish Gupta, Monika Singh, Ravi Parkash Verma, Reema Budhiraja

COURSE OUTCOMES - At the end of the course, students will be able to:		**COGNITIVE LEVELS**
CO1	Understanding the basics of electromagnetic wave propagation in a rectangular wave guide and its modeling in HFSS.	Understanding Level (C2)
CO2	Apply the concepts of electromagnetic wave propagation inside a rectangular waveguide to calculate various parameters.	Applying Level (C3)
CO3	Analyze the scattering parameters of an antenna in VNA and observe the radiation pattern of the antenna.	Analyzing Level (C4)
CO4	Determine the microwave power in Gunn Oscillator, Magic Tee and Directional Coupler.	Evaluating Level (C5)
CO5	Design a microstrip patch antenna in HFSS and observe its various parameters.	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.	CO1
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.	CO1
3.	Rectangular waveguide	To determine the frequency and wavelength in a rectangular waveguide working in TE_{10} mode.	CO2
4.	Rectangular waveguide	Determine experimentally the broader dimension of rectangular waveguide using microwave test bench at X-band of microwave frequency.	CO2
5.	Measurement	Determine experimentally the propagation characteristics of Magic Tee operating in X-band using microwave test bench.	CO4
6.	I-V characteristics of a Gunn Diode	To study the Gunn oscillator as a source of microwave power and hence to study and plot its I –V characteristics.	CO4

7.	Microstrip-feed Rectangular Microstrip Antenna	Study, Design and Modelling of the Microstrip-feed Rectangular Microstrip Antenna on ANSYS Electronics Desktop.	CO5
8.	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.	CO5
9.	Measurement of Input parameters of the antenna	Measurement of Input parameters of an Antenna using Vector Network Analyzer.	CO3
10.	Radiation Pattern	To plot and study the radiation pattern of Dipole and Yagi antennas.	CO3

Evaluation Criteria:

Components	**Maximum Marks**
Viva 1 (Mid Sem Viva)	20
Viva 2 (End Sem Viva)	20
Assessment Components	30
Lab Record	15
Attendance	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 fields. They can also analyze the different modes for a given rectangular waveguide and operating frequency. Moreover, they will design a microstrip patch antenna. They will be able to operate and characterize different microwave devices such as Gunn Diode and Magic Tee. Students can also plot and measure the radiation patterns of the given antenna. Most importantly students will be able to simulate and characterize the designed antennas and waveguides with the help of ANSYS Electronics Desktop. After designing and subsequent fabrication, antennas can also be measured using a vector network analyzer available in the lab. Thus, students can make different projects by using the knowledge gained from the above mentioned experiments.

Recommended Reading Material:

1.	M.N.O. Sadiku, S.V. Kulkarni, Principles of Electromagnetics, Oxford Press, 6th Edition, 2016.
2.	C.A. Balanis, Advanced Electromagnetics, Wiley, 2nd Edition, 2012.
3.	S.Y. Liao, Microwave Devices and Circuits, Pearson, 2nd Edition, 2003.
4.	C.A. Balanis, Antenna Theory: Analysis and Design, Wiley, 4th Edition, 2016.

Detailed Syllabus
Lab-wise Breakup

Course Code	**18B15EC313**	**Semester: ODD**	**Semester: Vth Session 2024-25** **Month from: July to December**
Course Name	**Embedded Systems and IoT Lab**		
Credits	1	**Contact Hours**	2 per week

Faculty (Names)	**Coordinator(s)**	Ritesh Kr. Sharma, Vimal Mishra
	Teacher(s) (Alphabetically)	Abhay Kumar, Gaurav Verma, Rachna Singh, Ruby Beniwal

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	**Recall** the basic of digital electronics and relate its use in microprocessors and microcontrollers.	Remembering (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 (C2)
CO3	**Apply** the skills and proficiency in the programming to demonstrate the use of instructions in microprocessors, microcontrollers and IOT Devices.	Applying (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 (C4)
CO5	**Design** a project that encompasses the use embedded systems and IoT for real time applications.	Creating (C6)

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 & division of two 8-bit numbers using 8085 microprocessor.	1,2,3
3.	8051 Microcontrollers	Familiarization with 8051 Software Tools (Proteus & Keil) through examples of: a. LED Blinking. b. Varying square wave generation on any pin (without timers).	2,3,4
4.	8051 Microcontrollers	Design a token display system that has a seven segment display and switches. Whenever any switch is pressed the corresponding number is displayed on the segment.	2.3,4
5.	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 counts, YELLOW for 5 counts, GREEN for 10 counts. Interface a light-dependent resistor (LDR) to select manual and automatic mode using interrupt.	2.3,4
6.	8051 Microcontrollers	Display a) JIIT on LCD b) Sum of two 8 bit numbers on LCD.	2.3,4
7.	IoT	Design an IOT based system using ESP8266 for controlling of home appliances	3,4,5
8.	IoT	Familiarization with NodeMcu /ARDUINO board/ESP8266 through examples of LED Blinking.	2,3,4
9.	IoT	Design an IOT based system to sense the humidity and	3,4,5

		temperature using DHT11 sensor and send it to cloud.	
10.	IoT	Controlling of different household devices using an Android based application through bluetooth communication and microcontroller.	3,4,5
11.	8085 Microprocessors	To find out the smallest & largest number in an array of 'N' 8-bit numbers using 8085 microprocessor.	1,2,3
12.	8051 Microcontrollers	Establish the serial communication between PC and microcontroller using RS232 protocol to send and receive the data.	3,4
13.	8051 Microcontrollers	Interface a DC motor and two IR sensors with the microcontroller. The IR sensors are used to control the direction of rotation of the motor.	3,4
14.	IoT	Design a RFID based attendance system using LCD and microcontroller.	3,4,5
15.	IoT	Design a DTMF based wireless system using microcontroller for controlling of home appliances.	3,4,5

Evaluation Criteria

Components	**Maximum Marks**
Viva 1(Mid Sem Viva)	20
Viva 2(End Sem Viva)	20
Assessment Components	20
Attendance	15
Lab Record	15
Project	10
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.	Ramesh S Gaonkar "Microprocessor Architecture- Programming & Applications with 8085/8080A", Penram International Publishing (India) Pvt. Ltd, 6th Edition, 2013
2.	Muhammad Ali Mazidi, Rolin McKinlay and Janice Gillispie Mazidi, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson, 2007
3.	Manish k. Patel, "The 8051 Microcontroller Based Embedded Systems", 1st Edition, McGraw Hill Education, 2014.
4.	Yashavant Kanetakr/Shrirang Korde, "21 IOT Experiments", BPB Publications, 1st Edition, 2018
4.	Divyah Bala, ESP8266: Step by Step Tutorial for ESP8266 IOT, Arduino Nodemcu Dev Kit, 2018.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15EC314	**Semester Odd (specify Odd/Even)**	**Semester** 5th **Session** 2024 **Month from** July - Dec
Course Name	Python for Signal processing and Communication		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Kapil Dev Tyagi, Pankaj Yadav
	Teacher(s) (Alphabetically)	Kapil Dev Tyagi, Pankaj Yadav, B. Suresh Juhi Gupta, Richa Gupta, Vivek Dwivedi.

COURSE OUTCOMES: At the completion of the course, students will be able to:		**COGNITIVE LEVELS**
C310. 1	Recall various concept, syntax and operation of python	Remembering Level (C1)
C310.2	Understand applications of Python in signal processing and communication.	Understanding Level (C2)
C310.3	Apply Python for implementing signal operations, transformations on 1-D and 2-D signals and for developing Machine learning algorithms.	Applying Level (C3)
C310.4	Analyze the different blocks of signal processing and communication systems using Python.	Analyzing Level (C4)

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

13.	Virtual Lab 1	To learn file operations in Python
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.

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
Lecture-wise Breakup

Subject Code	**20B12EC211**	**Semester** **Odd**	**Semester** 5th **Session** 2024-25 **Month from** July 24 to Dec 24
Subject Name	**Introduction to Digital Image and Video Processing**		
Credits	**3**	**Contact Hours**	**3**

Faculty (Names)	**Coordinator(s)**	Dr. Abhishek Kashyap
	Teacher(s) (Alphabetically)	Dr. Abhishek Kashyap, Dr. Bhawna Gupta

COURSE OUTCOMES Upon completion of the course, the student will be able to:		**COGNITIVE LEVELS**
C330-2.1	Recall the basics of analog & digital signals, 2D & 3D signals.	Remembering Level (C1)
C330-2.2	Demonstrate the image formation model, digital image display science and storage formats. Also illustrate various transformation techniques.	Understanding Level (C2)
C330-2.3	Applying image transformation, enhancement and restoration in various applications.	Applying Level (C3)
C330-2.4	Examining video storage formats and their requirements. Analyse compression algorithms and determining the effects of compression on different parameters of image and video.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Human visual system and Image perception	Image sensing and acquisition visual perception, Noise in images	3
2.	Image digitization, Display and Storage	Analog and digital signals, 2D and 3D signals, Image sampling and quantization, Pixel connectivity, Distance measures	3
3.	Image Transforms	Unitary transforms, 2D DFT, DCT, KL and Harr transform	5
4.	Image analysis	Edge and line detection, Hough transform, segmentation, feature extraction, classification image texture analysis, Color models and color image processing	7
5.	Image Enhancement	Gray level transformation, histogram processing, Smoothing and sharpening spatial Filters, Smoothing and sharpening frequency domain filters	7
6.	Image Restoration	Linear degradation model, inverse and Wiener filtering	5

7.	Video Display and Storage	Principle of color video camera, video camera, digital video, Sampling of video Signals, Video Frame classifications, I, P and B frames, Digital Video formats	3
8.	Video Processing	Introduction to Video analysis, enhancement and restoration	5
9.	Image and Video Compression	Lossless and Lossy compression standards, Image/Video Quality parameters	4
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 – This course provides practical exposure to digital image and video processing methods such as enhancement, restoration, noise reduction, compression and transformation etc. The students are trained for various methods of image transformation and their characteristics. Students are thereby able to apply the concepts in practical applications like motion blurring and compression.

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.C. GONZALEZ & R.E. WOODS: Digital Image Processing, 4th ed. Pearson Education Ltd, 2018.
2.	W.K. PRATT: Digital image processing: PIKS scientific inside, John Wiley, 2007.
3.	A. K. JAIN: Fundamentals of Digital Image Processing, Information and System Sciences Series, Prentice Hall, 1989.
4.	A. M. TEKALP: Digital Video Processing, Signal Processing Series, Prentice Hall, 1995.
5.	J.W. WOODS: Multidimensional Signal, Image and Video Processing and Coding, 2nd ed. Academic Press, 2012.

Detailed Syllabus
Lecture-wise Breakup

Course Code	22B12EC412	**Semester-** Odd **(specify Odd/Even)**	**Semester -5th / Session 2024-25** **Month from** July to Dec
Course Name	Introduction to Power electronics		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Dr. Ruby Beniwal
	Teacher(s) (Alphabetically)	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C430-4.1	Recall fundamental concepts and techniques used in power electronics	Remembering Level (C1)
C430-4.2	Explain rectifiers & converters and their basic operating principles used in power electronics circuits.	Understanding Level (C2)
C430-4.3	Apply various single phase and three phase power electronics circuit and understand their applications.	Applying Level (C3)
C430-4.4	Analyze the basic requirements for power electronics application	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	**Introduction**	Overview of power electronics, Applications of Power Electronics, Types of Power Electronic Circuits, Peripheral Effects, Characteristics and Specifications of Switches.	4
2.	**Power electronic devices**	**Solid State Power Devices:** Principle of operation of SCR, dynamic characteristic of SCR during turn ON and turn OFF, parameters of SCR, dv/dt and di/dt protection, snubber circuit, commutation circuits; Heat sink design. **Modern Power Devices**: Principle of operation of MOSFET, IGBT, GTO, MCT, SIT, SITH, IGCT, their operating characteristics. **Power Transistors:** Bipolar Junction Transistors – Steady State Characteristics, Switching Characteristics, Switching Limits.	12
3.	**Rectifiers**	**Controlled Rectifiers:** Introduction, Single-Phase Full Converters, Single-Phase Dual Converters, Three-Phase Full Converters, Three-Phase Dual Converters. **AC Voltage Controllers:** Introduction, Single-Phase Full-Wave Controllers with Resistive Loads, Single-Phase Full-Wave Controllers with Inductive Loads, Three-Phase Full-Wave Controllers.	8

4.	**DC-DC Converters**	Introduction, principle of step down and step up chopper with RL load, performance parameters, DC-DC converter classification.	9
5.	**DC-AC converters**	Introduction, principle of operation single phase bridge inverters, three phase bridge inverters, voltage control of single phase inverters, Harmonic reductions, Current source inverters.	9
		Total number of Lectures	**42**

Project Based Learning: Students will be asked to do the analysis and designing of the power electronics systems. Students can model and simulate the system using SPICE.

Evaluation Criteria

Components	**MaximumMarks**
Mid-Term	30
EndSemesterExamination	40
TA	30
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.	Bimbhra, P.S., *Power Electronics*, Khanna Publishers, 2021.
2.	Rashid, M. H., *Power Electronics: circuits, devices & applications*,Pearson Education, 2014.
3.	Luo F. L., Ye H., *Advanced DC/DC Converters*, CRC Press 2017
4.	Mohan, N., Undeland, T. M., & Robbins, W. P., *Power electronics: converters, applications, and design*. John wiley & sons 2003.

Detailed Syllabus
Lab-wise Breakup

Course Code	15B19EC591	**Semester** Odd **(specify Odd/Even)**	**Semester:** 5th **Session:** 2024 -2025 **Month:** July to December
Course Name	Minor Project - 1		
Credits	2	**Contact Hours**	NA

Faculty (Names)	**Coordinator(s)**	Dr. Ankur Bhardwaj, Dr. Atul Kumar
	Teacher(s) (Alphabetically)	Dr. Bhartendu Chaturvedi, Mr. Ritesh Sharma

COURSE OUTCOMES: At the completion of the course, students will be able to:		**COGNITIVE LEVELS**
C350.1	Recall the essential concepts and find the potential areas to work.	Remembering Level (C1)
C350.2	Explain the project objectives through exhaustive literature survey in the chosen area.	Understanding Level (C2)
C350.3	Identify the project gaps and organize, demonstrate and communicate the learning through project report and oral presentation.	Applying Level (C3)
C350.4	Examine and integrate the knowledge gained in various courses into the practical form.	Analyzing Level (C4)
C350.5	Evaluate the existing techniques/algorithms comes under project objectives.	Evaluating Level (C5)
C350.6	Design and implement a working model to justify the project objectives.	Creating Level (C6)

Evaluation Criteria

Components	**Maximum Marks**
Mid Semester Evaluation	40
End Semester Evaluation	40
Report	20
Total	**100**

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11CI518	**Semester -** ODD	**Semester** V **Session** 2024 -25 **Month from** July '24 to Dec '24
Course Name	Data Structures & Algorithms		
Credits	3	**Contact Hours**	3-0-0

Faculty (Names)	**Coordinator(s)**	Prantik Biswas (J62), Prof. Krishna Asawa (J128)
	Teacher(s) (Alphabetically)	Aditi Priya, Dr. Arpita Jadhav Bhatt, Prof. Krishna Asawa, Dr. Manju, Prantik Biswas

COURSE OUTCOMES		**COURSE OUTCOMES**
C311.1	Explain the complexity of different algorithms.	Understand [Level 2]
C311.2	Develop various linear data structures and their related operations.	Apply [Level 3]
C311.3	Develop various non- linear data structures and their related operations.	Apply [Level 3]
C311.4	Apply appropriate data structure/ algorithmic design technique to solve a given problem.	Apply [Level 3]
C311.5	Analyze relevant data structure and algorithm for a given problem with respect to its performance.	Analyze [Level 4]

Module No.	**Title 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, Stacks – implementation (array and linked list based) and applications, Queues: linear, and queue applications, circular, deque – implementation and applications;	11
2.	Algorithm Complexity	Abstract data type, Growth of function, Space-Time tradeoffs, Complexity analysis of algorithms - Asymptotic analysis	2
3.	Sorting & Searching	Searching – Linear, and binary search; Sorting – bubble, insertion, and selection, Merge Sort, Quick sort, Count sort, Bucket Sort	6
4.	Trees	Binary Tree, Binary Search tree, AVL 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 (N-Queen), Greedy algorithm, Problems on Greedy algorithm (0/1, Fractional Knapsack), Graph Algorithms- Shortest path using Dijkstra algorithm and Graph coloring	7

		Dynamic programming, Problems on Dynamic Programming (0-1 Knapsack, Longest Common Subsequence)	
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 07, Class Test/Quiz= 07, Internal assessment = 05 Assignments in PBL mode = 06)
Total	**100**

PBL – Students will be asked to work in teams of 3-5 members for exploring and submitting projects related to real-life problems using various data structure concepts.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc.

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^{nd} edition (2017)

References

1.	Yedidyah Langsam, Moshe J., Augenstein and Aaron M. Tenenbaum: Data Structures Using C and C++, 2^{nd} 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.	Mark Allen Weiss: Data Structures and Algorithm Analysis in C, 2^{nd} Edition, Pearson
5.	Sahni: Data Structures, Algorithms and applications in C++, Universities press, Hyderabad, 2005
6.	Kruse, Tonso, Leung: Data Structures and Program Design in C, 2rd Edition, Pearson Education Asia, 2002
7.	Weiss, Mark Allen: Data Structures and Algorithm Analysis in C/C++, 2nd Edition, Pearson Education Asia, 2003
8.	Cormen et al: Introduction to Computer Algorithms, 2nd edition , PHI New Delhi 2003
9.	Aho, Hopcraft, Ullman: Data Structures and Algorithms, Pearson Education Asia (Adisson Wesley), New Delhi, 2001
10.	Standish: Data Structures in Java, Pearson Education Asia (Adisson Wesley), New Delhi, 2000
11.	Knuth: The Art of Computer programming Vol I, Vol III, 2nd edition , Pearson Education Asia (Adisson Wesley), New Delhi, 2002

<u>Detailed Syllabus</u>

Subject Code	15B17CI578	**Semester:** ODD	**Semester:** 5 **Session** 2024-2025 **Month from** July'24 **to** Dec'24
Subject Name	Data Structures & Algorithms Lab		
Credits	0-0-1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Manju (J62) and Aditi Priya (J128)
	Teacher(s) (Alphabetically)	J62: Astha Singh, Manju, Prantik Biswas, Shikha Jain, Tanvi Gautam Varun J128: Aditi Priya

COURSE OUTCOMES		**COGNITIVE LEVELS**
C371.1	Develop various linear data structures and their related operations.	Apply [Level 3]
C371.2	Develop various non- linear data structures and their related operations.	Apply [Level 3]
C371.3	Apply appropriate data structure/ algorithmic design technique to solve a given problem.	Apply [Level 3]
C371.4	Analyze code in hand with respect to its performance (time and space).	Analyze [Level 4]
C371.5	Create real time solution for small day to day problems using appropriate data structures and algorithms.	Create [Level 6]

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction & Algorithm Complexity	Conversion from one number system to another; Manipulation with arrays and strings, structures; Manipulation with a single Linked list of integers; Stacks and Queues Finding Complexity: Big O, Big Omega Cost Analysis	CO1, CO4, CO5
2.	Sorting, Searching & Trees	Doubly Linked List, Circular Linked List Multi-Linked Lists; Sorting, Searching, Application based. Binary Tree, Binary Search Trees, AVL Tree, Case-study: Priority Queue with Binary Trees, B Trees	CO1, CO2, CO5

3.	Heaps, Graph	Heaps, Directed and undirected graphs, weighted graphs, etc.	CO2, CO5
4.	Hashing & other Algorithms	Hashing, Backtracking, Branch and Bound, Greedy Algorithms, Dynamic Programming.	CO3, CO5

Evaluation Criteria

Components	**Maximum Marks**
Lab Test 1	20
Lab Test 2	20
Evaluation 1	15
Evaluation 2	15
Mini-Project	15
Day-to-Day - Attendance	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)

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, 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)
References	
1	Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Fourth Edition (2014).
2	Handbook of Data Structures and Applications, 2nd Edition by Sartaj Sahni, Dinesh P. Mehta, CRC Press (2018).
3	Problem solving with algorithms and data structures, Miller, B., & Ranum, D. (2013).
4	Data Structures and Algorithms in C++, Adam Drozdek, Cengage Learning; 4th edition (2012)

Detailed syllabus
Lecture-wise Breakup

Subject Code	**16B1NHS432**	**Semester: ODD**	**Semester V Session 2024-2025** **Months: from July to December**
Subject Name	**POSITIVE PSYCHOLOGY**		
Credits	**3**	**Contact Hours**	**(3-0-0)**
Faculty (Names)	**Coordinator(s)**	**Dr. Badri Bajaj (JIIT-62) & Dr. Shweta Verma (JIIT-128)**	
	Teacher(s) (Alphabetically)	**Dr. Badri Bajaj, Dr. Shweta Verma**	

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Demonstrate an understanding of various concepts and perspectives of positive psychology	Understanding Level (C2)
CO2	Apply the concepts of positive psychology in day-to-day life	Applying Level (C3)
CO3	Evaluate interventions and strategies for overall positive functioning	Evaluating Level (C5)
CO4	Develop solutions for personal happiness, well-being, and mental health	Creating Level (C6)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction to Positive Psychology	Overview, Perspectives, Classification and Measures: Human Strengths and Positive Outcomes.	**6**
2.	Prosocial Behavior	Empathy and Egotism; Altruism, Gratitude, and Forgiveness.	**6**
3.	Positive Emotions and Wellbeing	Emotional and Cognitive States; Focus on Application: Finding the positive in the Negative; Positive Emotions & Well-Being; Positive Emotions & Flourishing; Flow Experiences	**6**
4.	Happiness	Happiness and its Traditions; Determinants- Subjective Well-Being Hedonic Basis of Happiness; Life Satisfaction; Self – Realization: The Eudaimonic Basis of Happiness Happiness and Emotional Experiences; Other Facts of Life- Work & Unemployment;	**6**

		Intelligence; Education; and Religion.	
5.	Mental Health	Mental Health and Behavior; Prevent the Bad and Enhance the Good.	**6**
6.	Positive Environments	Positive Schooling, Good at Work, Balance Between ME and WE.	**6**
7.	Living Well	Mindfulness; Contours of a Positive Life: Meaning & Means; Cultural Context, Every Stage of Life, Resilience, Positive Youth Development, Life Tasks of Adulthood, Successful Aging.	**6**
Total number of Hours			**42**

Evaluation Criteria

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

Project based learning: Each student will think of some personal and professional goals. The student will apply the learnings from the course topics from the first five modules and make and execute plan for achievement of their goals. Each student can take help from any other student in the class. Students will devise strategies using learning from five modules of the course for reaching their goals. They will evaluate their strategies as well. Students will work on three to five goals (a mix of personal and professional goals)
Each student will make a presentation in the class and will also submit a project report.

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.	Snyder, C.R., Lopez, S. J., & Pedrotti, J.T. *Positive Psychology: The Scientific and Practical Explorations of Human Strengths*, 4th Ed., Sage Publications, 2018.
2	Steve, B., & Marie, C. *Positive psychology*, 1st Ed., Pearson Education India, 2014.
3.	Boniwell, I., & Tunariu, A. D., *Positive Psychology: Theory, Research and Applications*, 2nd Ed., McGraw-Hill Education, 2019.
4.	Zelenski, J., *Positive Psychology: The Science of Well-being*, 1st Ed., Sage Publications, 2019.
5.	Snyder, C. R., Lopez, S. J., Edwards, L. M., & Marques, S. C. (Eds.), *The Oxford handbook of positive psychology*. 1st Ed., Oxford university press, 2020.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS433**	**Semester: Odd**	**Semester: Session** 2024-2025 **Month from: Julyto Dec**
Course Name	Financial Management		
Credits	3	**Contact Hours**	3 (3-0-0)

Faculty (Names)	**Coordinator(s)**	Prof. Mukta Mani, Dr.Sakshi Varshney
	Teacher(s) (Alphabetically)	Prof. Mukta Mani, Dr.Sakshi Varshney

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-3.1	Understand the fundamental concepts of Financial Management and its various dimensions	Understanding (Level 2)
C303-3.2	Apply the knowledge of the time value of money, capital budgeting techniques, cost of capital and in taking long-term investment decisions	Applying (Level 3)
C303-3.3	Analyze the leverage capacity of a business and applyit inthe selection of Long-term sources of finance.	Analyzing (Level 4)
C303-3.4	Evaluatethe financial performance of a business through financial statements	Evaluating (Level 5)

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 StructureDecision and Working Capital Management	Break Even Analysis, Operating, Financial and combined leverage, Capital structure EBIT- EPS analysis, Concept ofworkingcapitalmanagement, practical considerations 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	Maximum Marks
Components	
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 for a company which is listed in at least one of the stock exchanges of India.To make the subject application based, the students analyze the latest financial data and other information of the last two years of the chosen company by the financial tool of Ratio analysis and use this financial data for decision-making. Understanding the Balance Sheet and financial statements of the business firm enhances the student's knowledge of the organisational structure of the firm and financial analysis helps their employabilityinthe financial sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Textbooks, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Chandra, P., *Financial Management Theory and Practice*,11th ed., Tata McGraw Hill, 2022.
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_fundfinman_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, 2020.
4.	Kishore, R.M., *Financial Management*, 8th ed, Taxmann, 2020
5.	Mukherjee,M and Hanif.M., Financial Accounting, 8th ed., Tata McGraw Hill,2008.
6.	Pandey, I.M., Financial management, 12th ed, Vikas Publishing House Pvt Ltd, 2021

Detailed Syllabus
Lecture-wise Breakup

Subject Code	16B1NHS434	**Semester: ODD**	**Semester V Session 2024-25** **July - 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.	CL-2 Understand
C303-6.2	Apply literary and linguistic theories on the texts to identify them as cultural constructs.	CL-3 Apply
C303-6.3	Analyze select representative texts of different cultures thematically and stylistically.	CL-4 Analyse
C303-6.4	Evaluate literature as reflection of society through a research-based paper/poster presentation individually and / or in a team.	CL-5 Evaluate
C303-6.5	Create literary, non-literary write-up with proper applied grammar usage.	CL-6 Create

.

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,	4

		Biographies	
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**

Evaluation Criteria

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

PBL Component:

The project is to be done in a group of 5-6 students. Students would take a text (Novel /play/adaption) of their choice which is based on some of the myths of East or West, but it should not be any of the texts taught in V Semester syllabus of this course and compare it with the assigned text through the application of specified theories.

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

<u>Detailed Syllabus</u>
Lecture-wise Breakup

Subject Code	**16B1NHS435**	**Semester : ODD**	**Semester: V Session: 2024-25** **Month: July 2024 to December 2024**
Subject Name	**SOCIOLOGY OF MEDIA**		
Credits	**3**	**Contact Hours**	**(3-0-0)**

Faculty (Names)	**Coordinator(s)**	**Prof. Alka Sharma**
	Teacher(s) (Alphabetically)	**Dr Nibha Sinha**

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 ● Free-speech Media	5

	Media & State		
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	8
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 and Presentation)
Total	**100**

PBL: 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	Deana A. Rohlinger (ed.), Sarah Sobieraj (ed.), “The Oxford Handbook of Digital Media Sociology” Publisher: Oxford University Press, 2020
2	Danielle Antoinette Hidalgo, *Dance Music Spaces: Clubs, Clubbers, and DJs Navigating Authenticity, Branding, and Commercialism*, Lexington Books, 2023.
3.	Joseph Turow, *Media Today: An Introduction to Mass Communication*,3rd Ed., Taylor & Francis. UK. (2008).
4.	JA Fisher ‘High Art v/s Low Art, in Berys Nigel Gaut& Dominic Lopes (eds.), *The Routledge Companion to Aesthetics*. Routledge2001
5.	G.Ritzer, ‘McDonaldization of Society,. *The Journal of American Culture*. Volume 6, Issue 1. (2001 [1983])Pp. 100-107.
6.	Manuel. Castells,‘Introduction’, in *Rise of Network Society: The Information Age: Economy, Society and Culture*, 2nd Ed (1996).

Course Description

<table>
<tr><td>Course Code</td><td>16B1NMA531</td><td colspan="2">Semester Odd</td><td colspan="2">Semester V Session 2024-25
Month from July 2024- Dec 2024</td></tr>
<tr><td>Course Name</td><td colspan="5">Discrete Mathematics</td></tr>
<tr><td>Credits</td><td colspan="2">3</td><td colspan="2">Contact Hours</td><td>3-0-0</td></tr>
<tr><td rowspan="2">Faculty (Names)</td><td>Coordinator(s)</td><td colspan="4">Dr. Anuj Bhardwaj</td></tr>
<tr><td>Teacher(s) (Alphabetically)</td><td colspan="4">Dr. Anuj Bhardwaj</td></tr>
<tr><td colspan="5">COURSE OUTCOMES: After the successful completion of this course, the student will be able to</td><td>COGNITIVE LEVELS</td></tr>
<tr><td>C301-1.1</td><td colspan="4">recall basics of set theory, functions and relations.</td><td>Remembering (C1)</td></tr>
<tr><td>C301-1.2</td><td colspan="4">explain lattices, generating function, propositional calculus, algebraic structure, graphs and formal languages.</td><td>Understanding (C2)</td></tr>
<tr><td>C301-1.3</td><td colspan="4">solve the problems related to Z- transform, propositional calculus, algebraic structures and formal languages.</td><td>Applying (C3)</td></tr>
<tr><td>C301-1.4</td><td colspan="4">analyse different graph theoretic algorithms for solving related problems.</td><td>Analyzing (C4)</td></tr>
<tr><td>Module No.</td><td>Title of the Module</td><td colspan="3">Topics in the Module</td><td>No. of Lectures for the module</td></tr>
<tr><td>1.</td><td>Relations and Lattices</td><td colspan="3">Relations and their composition. Pictorial representation, matrix and graphical representations. Equivalence relations and partitions. Partial ordered relations and Hasse diagram. Lattices.</td><td>5</td></tr>
<tr><td>2.</td><td>Functions</td><td colspan="3">Functions and Recursively defined functions, generating functions, solution of recurrence relations by generating function. Z transforms, solution of difference equations by Z transform.</td><td>8</td></tr>
<tr><td>3.</td><td>Propositional Calculus</td><td colspan="3">Propositions- simple and compound. Basic logical operators. Implication. Truth tables. Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers.</td><td>4</td></tr>
<tr><td>4.</td><td>Graphs</td><td colspan="3">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.</td><td>7</td></tr>
<tr><td>5.</td><td>Directed Graphs</td><td colspan="3">Trees, Digraphs and related definitions. Rooted trees. Algebraic expressions and Polish notation. Sequential representation. Adjacency matrix. Path matrix. Shortest path. Linked representation of directed graphs. Binary trees.</td><td>5</td></tr>
<tr><td>6.</td><td>Algebraic Structures</td><td colspan="3">Groups- definitions and examples, order of elements, subgroup, condition for subgroups. Quotient groups, Lagrange theorem and</td><td>7</td></tr>
</table>

		applications, Rings, integral domains and Fields-definition and examples.	
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, 2^{nd} Edition, Tata McGraw-Hill, 1997.
2.	**Rosen, K. H.,** Discrete Mathematics and its Application, 7^{th} Edition, Tata McGraw-Hill, 2011.
3.	**Liu, C. L.**, Elements of Discrete Mathematics, 2^{nd} Edition, Tata McGraw-Hill, 1998.
4.	**Kolman, B., Busby, R. C. and Ross, S.,** Discrete Mathematical Structures, 6^{th} Edition, Prentice Hall, 2018.
5.	**Deo, N.,** Graph Theory, Prentice Hall, 2004.
6.	**Grimaldi, R.P.,** Discrete and Combinatorial Mathematics, 5^{th} Edition, Pearson Education, 2011.

Course Description

Course Code	16B1NMA731	**Semester** Odd	**Semester** V **Session** 2024-25 **Month from** July- Dec 2024
Course Name	Theory of Numbers		
Credits	3	**Contact Hours**	3-0-0
Faculty (Names)	**Coordinator(s)**	Dr. Himanshu Agarwal	
	Teacher(s) (Alphabetically)	Dr. Himanshu Agarwal	

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C301-4.1	explain concepts related to divisibility, congruences, numbers of special form, number theoretic functions, primitive roots and indices.	Understanding (C2)
C301-4.2	solve the system of linear congruences using properties of congruences, Euclid algorithm and Chinese remainder theorem.	Applying (C3)
C301-4.3	apply the concepts of primitive roots, indices, Legendre symbol and quadratic residue to solve the nonlinear congruences.	Applying (C3)
C301-4.4	analyze the concepts of number theory in hashing, cryptography, calendar and ISBN check digits problems.	Analyzing (C4)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	**Divisibility and Primes**	Division algorithm, Greatest common divisor, Euclid's algorithm, gcd as a linear combination of coprime integers, Linear Diophantine equations, primes, The fundamental theorem of arithmetic, The Sieve of Eratosthenes, Canonical prime factorization, Least common multiple, Prime number theorem(statement only), Goldbach and twin primes conjectures.	5
2	**Theory of Congruences**	Definitions and basic properties, Residue classes, complete residue systems, reduced residue systems, Linear congruences in one variable, Simultaneous linear congruences, Chinese remainder theorem and its applications, Linear congruences in more than one variable, Fermat's theorem, Pseudoprimes and carmichael numbers, Wilson's Theorem	4

3.	**Number Theoretic Functions and Numbers of Special Form**	Greatest integer function, The number-of-divisors function, The sum-of-divisors function, Multiplicative function, The Mobius function, Mobius inversion formula, The Euler's totient function, Euler's theorem, Perfect numbers, characterization of even perfect numbers, Mersenne primes, Fermat primes	8
4.	**Primitive Roots and Indices**	The order of an integer, Primitive roots, Theory of indicies, Solution of non-linear congruences.	9
5.	**Quadratic Residues**	Quadratic residues and non-residues, Euler's Criterion, The Legendre symbol, Gauss Lemma, Quadratic reciprocity, Solution of quadratic congruences.	8
6.	**Applications**	Hashing functions, Cyptosystem, Calendar problem, ISBN check digits	8
		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

Project based learning: Each student in a group of 4-5 will analyse applications of Chinese remainder theorem in congruency problems. Also the students will explore the applications of secure communication techniques, Cyptosystem, Calendar problem, ISBN check digits.

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)

1.	**James Strayer**, Elementary Number Theory, Waveland Press, 1994/2002, ISBN 1-57766-224-5.
2.	**Kenneth Rosen**, Elementary Number Theory and its Applications, 5th Edition, McGraw Hill, ISBN 0-201-87073-8.
3.	**I. Niven, H. Zuckerman, H. Montgomery**, An Introduction to the Theory of Numbers, 5th Edition, Wiley, ISBN 0471625469.
4.	**David M. Burton**, Elementary Number Theory, 7th Edition, McGraw Hill Education (India) Private Limited.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NPH531	**Semester: ODD**		**Semester V Session** 2024 -2023 **Month from** July to December
Course Name	**Quantum Mechanics for Engineers**			
Credits	3		**Contact Hours**	3-0-0

Faculty (Names)	**Coordinator(s)**	Prof. Papia Chowdhury
	Teacher(s) (Alphabetically)	Prof. Papia Chowdhury

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 Applications	Matrix and linear algebra, Eigen values and eigenfunctions Hilbert space, Kets, Bras and Operators, Bras Kets and Matrix representations, Measurements, Stern Gerlach Experiment, Observables and Uncertainty Relations, No-cloning theorem, Pauli Spin Matrices.	10
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.	Approximation 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 (05 M), Class Test, Quizzes, *etc* (06 M), Assignments in PBL mode (10 M), and Internal assessment (04 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:** 2024 -2025 **Month from July 24 to December 24**
Course Name	Materials Science		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Dr. Amit Verma and Dr. Ashish Bhatnagar
	Teacher(s) (Alphabetically)	Dr. Amit Verma and Dr. Ashish Bhatnagar

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, Figure of Merit; TE power generation (efficiency), refrigeration (COP), Examples and applications.	**3**

		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** 2024-2025 **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	Defining the properties and principle of lasers	Remember Level (C1)
C301-12.2	Understanding of various applications of lasers	Understand Level (C2)
C301-12.3	Ability to apply the concepts of standard techniques for the pulsed operation of laser and stability of laser resonator	Apply Level (C3)
C301-12.4	Analysis of types of lasers	Analyze 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 length measurement, velocity measurement, Laser Tracking, Metrology and LIDAR. Lasers in medicines and surgery. Lasers in defense, Lasers in space sciences, Lasers	12

		in sensors.	
		Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [Attendance (05 M), Class Test, Quizzes, *etc* (06 M), Assignments in PBL mode (10 M), and Internal assessment (04 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: V Session: 2024-25** **Month from**: July to December
Course Name	Nuclear Science and Engineering		
Credits	3	**Contact Hours**	3

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

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 (05 M), Class Test, Quizzes (06 M), Assignments in PBL mode (10 M), and Internal assessment (04 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	17B1NMA533	**Semester** Odd	**Semester** V **Session** 2024-25 **Month from** July-Dec 2024
Course Name	Statistical Information Theory with Applications		
Credits	3	**Contact Hours**	3-0-0
Faculty (Names)	**Coordinator(s)**	Prof. Amit Srivastava	
	Teacher(s) (Alphabetically)	Prof. Amit Srivastava	

COURSE OUTCOMES: After pursuing the above mentioned course, the students will be able to:		**COGNITIVE LEVELS**
C301-8.1	interpret the notions of entropy, relative entropy and mutual information in probabilistic and fuzzy frameworks.	Understanding Level(C2)
C301-8.2	apply the various measures of uncertainty and discrepancy in information distortion related problems.	Applying Level (C3)
C301-8.3	examine the importance of information theory in data compression problems.	Analyzing Level (C4)
C301-8.4	analyze problems related to encryption and decryption using information theoretic concepts.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Information Theoretic Measures	Review of Probability theory, Average information, Shannon and Renyi Entropy, Mutual information. Introduction to concepts of directed divergence, inaccuracy and information improvement	10
2.	Fuzzy Sets and Measures of Fuzzy Uncertainty.	Fuzzy Sets. Fuzzy Uncertainty and Fuzzy Information Measure, Similarity Measures, Fuzzy Measures of Directed Divergence, Total Ambiguity and Information Improvement, R-Norm Fuzzy Information Measure and its Generalizations.	10
3.	Source Coding	Data compression, Kraft-Mcmillan Equality and Compact Codes, Encoding of the source output, Shannon-Fano coding, Huffman coding, Lempel-Ziv (LZ) coding, Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding. rate distortion theory, Lossy Source coding.	10

4.	Applications of information theory in Cryptography	Basic concepts of cryptography and secure data, Mathematical Overview and Shannon theory of Cryptography, perfect secrecy and the one time pad, Spurious Keys & Unicity Distance, Classical and Product Cryptosystems. semantic security and Stream ciphers, Characteristics for perfect security, Limitations of perfectly secure encryption, Block and Stream ciphers, Cipher Modes, Substitution Ciphers, Mono-alphabetic Substitution and Poly-alphabetic Substitution, Polygram, Transposition Ciphers, Rail Fence, Scytale, Book cipher, Vernam cipher, VigenereTabluae, Playfair, Hill Cipher, Cryptanalysis of Classical Cryptosystems,	12
		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**

Project Based Learning: Each student in a group of 4-5 will apply the concepts of information theory in cryptography along with a detailed analysis of the proposed topic.

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.	**Bose, R.**,Information Theory Coding and Cryptography, 3rd Ed, Tata McGraw-Hill, 2016.
2.	**Jain, K. C., and Srivastava, A.,** Information Theory & Coding, 3nd Ed, Genius Publications, 2009
3.	**Stallings, W.,** Cryptography and Network Security Principles and Practices, Prentice Hall, 2003
4.	**Cover, T.M. and Thomas, J. A.,** Elements of Information Theory, 2nd Edition, Wiley, 2006.
5.	**Haykin, S.,** Communication Systems, John Willey & Sons, Inc, Newyork, 4th Ed, 2006
6.	**Behrouz, A. F.,** Introduction to Cryptography and Network Security, McGraw-Hill International Edition, 2008

Detailed Syllabus
Lecture-wise Breakup

Subject Code	**19B12HS311**	**Semester: ODD**	**Semester V Session 2024-25** **Month from July to December 2024**
Subject Name	**ENTREPRENEURSHIP DEVELOPMENT**		
Credits	**3**	**Contact Hours**	**3(3-0-0)**

Faculty (Names)	**Coordinator(s)**	**Dr Deepak Verma**
	Teacher(s) (Alphabetically)	**Dr Deepak Verma**

COURSE OUTCOMES:		**COGNITIVE LEVELS**
C303-8.1	Understand entrepreneurial fundamentals and considerations for developing a business idea	Understand Level (C2)
C303-8.2	Apply the entrepreneurial fundamentals to establish and develop business ventures and develop an entrepreneurial mindset	Apply Level (C3)
C303-8.3	Examine the importance of various critical business aspects such as marketing, finance and strategic planning in developing business	Analyze Level (C4)
C303-8.4	Assess strategies for resource hiring, Team management and leading 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)
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

Course Description

Course Code	18B12MA312	**Semester** Odd	**Semester** V **Session** 2024-25 **Month from** Aug 2024- Dec 2024
Course Name	Logical Reasoning and Inequalities		
Credits	3	**Contact Hours**	3-0-0
Faculty (Names)	**Coordinator(s)**	Dr. Lakhveer Kaur	
	Teacher(s) (Alphabetically)	Dr. Lakhveer Kaur	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above-mentioned course, the students will be able to:		
C301-9.1	Explain the concepts of mathematical inequalities, combinatorics, special numbers and logical reasoning.	Understanding (Level 2)
C301-9.2	apply the concepts of combinatorics and special numbers for solving various related problems.	Applying (Level 3)
C301-9.3	examine inequalities in the field of information theory and cryptography.	Analysing (Level 4)
C301-9.4	Analyse different problems using logical reasoning.	Analysing (Level 4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Inequalities	Basic Inequalities, Inequalities between means with special reference to AGM inequality, Jensen inequality for concave and convex functions, Hermite Hadamard inequality, Karamata's inequality, Popoviciu's inequality, Weighted AGM inequality and Young's inequality with applications in information theory, Bounds on Shannon entropy function and their generalizations, Perfect secrecy in cryptography.	12
2.	Basics of Counting	Pigeon Hole Principle, Binomial Theorem, Properties of binomial coefficients, combinatorial identities, Permutation of Multisets, Multinomial Theorem, Combinations of Multisets, Sterling's Formula, Generalization of Binomial coefficients, Inclusion exclusion principle.	12
3.	Special numbers	Catalan numbers, Partition numbers, difference sequences, Sterling Numbers, Perfect numbers.	10
4.	Logical Reasoning	Clocks, calendars, binary logic, seating arrangement, blood relations, logical sequence, assumption, premise, conclusion, linear and matrix arrangement, Syllogism, Binary Logic, Logical sequence &	8

		Matching, Mathematical Puzzles with applications.	
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**

Project based learning: Each student in a group of 3-4 will apply the concepts of logical reasoning to solve related practical problems.

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.	**Cerone, P. and Dragomir, S. S.**, Mathematical Inequalities, CRC Press, Boca Raton, FL, 2011
2.	**Praveen, R. V.**, Quantitative Aptitude and Reasoning, Second Edition, Prentice Hall India, 2013.
3.	**Rosen & Kenneth H**, Discrete Mathematics and its Applications, Tata Mc-Graw Hill, New Delhi, 2007.
4.	**Kolman B., Busby R. C. and Ross S.**, Discrete Mathematical Structures, Prentice Hall, 1996.
5.	**Simmons, G. J.,** The Great Book of Puzzles & Teasers, 1999.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**20B13HS311**	**Semester: Odd**	**Semester: V Session: 2024-25** **Month: July-December**
Course Name	**Indian Constitution and Traditional Knowledge**		
Credits	AUDIT	**Contact Hours**	**2-0-0**

Faculty (Names)	**Coordinator(s)**	Dr. Ila Joshi (Sec 62) & Dr. Gaurika Chugh (Sec 128)
	Teacher(s) (Alphabetically)	• Dr Gaurika Chugh • Dr. Ila Joshi • Dr. Namreeta Kumari • Dr. Shikha Kumari • Dr. Shweta Verma

CO Code	**COURSE OUTCOMES**	**COGNITIVE LEVELS**
C305.1	Develop an understanding of the historical background of the Constitution, its salient features, fundamental rights, fundamental duties and directive principles of the state policy.	Understanding (C2)
C305.2	Apply the traditional theories of Indian traditional political thought to the contemporary working of the state and its governance structures.	Applying (C3)
C305.3	Analyze the working of Indian federalism with reference to centre-state relations and cooperative federalism.	Analyzing (C4)
C305.4	Evaluate nature and working of the different organs of the government.	Evaluating (C5)

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 ● The Legislature: Parliament and its components- Lok Sabha and Rajya Sabha (composition and functions) ● The Judiciary: Supreme Court-composition, functions, appointment and jurisdiction	8
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 5th and 6th schedule ● Emergency provisions	6
4.	Traditional knowledge	● Kautilya- Theory of state ● Mandala theory ● Saptanga theory	6
		Total number of Lectures	**28**

Evaluation Criteria

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

Project Based Learning: 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 interpreted 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*, 6^{th} 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: 2024 -2025 A month from: July-December
Course Name	**Management Accounting**		
Credits	03	Contact Hours	3-0-0

Faculty (Names)	Coordinator(s)	Dr. Purwa Srivastava
	Teacher(s) (Alphabetically)	Dr Purwa Srivastava

COURSE OUTCOMES		COGNITIVE LEVELS
C303-10.1	Understand various aspects of the management accounting system including ethical conduct for accountants	Remembering (C1)
C303-10.2	Understand cost behaviour and apply cost-volume-profit analysis in decision making	Understanding (C2)
C303-10.3	Understand basic accounting concepts and analyze financial statements of a business organization	Applying (C3)
C303-10.4	Analyze various costing systems for cost allocation and pricing decisions	Analyzing (C4)
C303-10.5	Evaluate the master budget and carry out variance analysis for planning and management control decisions	Evaluating (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Basic Accounting concepts and financial statements	Accounting Concepts, principles, accounting equation, analysis of Balance sheet, Income statement, statement of changes in stockholders' equity, statement of cash flows. Common size statement, trend analysis and ratio analysis	7
2.	Management accounting system	Meaning of Management Accounting, Influences on accounting systems, Ethical conduct for accountants	7

3.	Cost Concepts and cost behaviour	Identifying resources, Activities, Costs and Cost drivers; Variable and Fixed cost behaviour; Cost-Volume-Profit Analysis	7
4.	Cost Management Systems	Direct, Indirect cost; Cost allocation; Traditional and Activity Based costing systems, special orders, pricing decision, cost-plus pricing, target costing, make or buy decision	7
5.	Budgetary Control	Introduction to budgets; Functional budgets, Master budgets, Fixed and flexible budgets, Budgets as financial planning models, Variance analysis	8
6.	Management control system	Organizational goal and performance measures, designing a management control system	6
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 products, two services or one product & one service. They will estimate the fixed and variable costs related to the business and carry outa 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 a projected master budget for the next three years which includes 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.
5.	Ghosh, T. P., Financial Accounting for Managers, 4th Edition, Taxmann Publications, 2009.
6.	Maheshwari, S.N., Maheshwari, S.K., Financial Accounting, 10th ed, Vikas Publishing House.

7.	Pandey, I.M., Financial management, 11th ed, Vikas Publishing House Pvt Ltd, 2015
8.	Chandra, P., Financial Management Theory and Practice, 7th ed., Tata McGraw Hill, 2007.
9.	Chawla, M, Chawla, C and Gupta, A. “India: Anti-corruption Compliance in India” Mondaq, January, 2021. Accessed on: 30th October 2021. Link: https://www.mondaq.com/india/white-collar-crime-anti-corruption-fraud/1022326/anti-corruption-compliance-in-india
10.	Tangdall, S. “The CEO of Starbucks and the Practice of Ethical Leadership”, Santa Clara University, 29th August 2018. Accessed on: 30th October 2021. Link: https://www.scu.edu/leadership-ethics/resources/the-ceo-of-starbucks-and-the-practice-of-ethical-leadership/

Detailed Syllabus				
Subject Code	**24B12HS314**	**Semester: ODD**	**Semester: V**	**Session: 2024-25** **Month: July to Dec**
Subject Name	**Contemporary India: A Sociological Perspective**			
Credits	**3**	**Contact Hours**	**3-0-0**	

Faculty Name	**Course Coordinator (s)**	**Dr Yogita Naruka**
	Teacher(s) (Alphabetically)	**Dr Yogita Naruka**

CO Code	Course Outcomes	Cognitive Levels
1	Students will be able to identify and understand the significance of key events and movements that changed the history of India's development experience.	Understanding, C2
2	Students will apply sociological perspectives to analyze and interpret contemporary issues and challenges facing Indian society.	Applying, C3
3	Students will critically analyze the impact of colonialism, independence, and liberalization on various aspects of Indian society, including culture, economy, politics, and social structure.	Analysing, C4
4	Students will be able to evaluate the processes that have resulted in the social and political changes in the contemporary India	Evaluating, C5

Module No.	Module Title	Topics	No. of lectures
1	Emergence of India as a Nation-State	Introduction to the course, idea of a nation-state, rise of India as a nation-state - Socio-political ramifications of Colonialism and Indian National Movement	8
2	Indian Sociological Perspectives -I	Indological Perspective (GS Ghurye), Structural Functionalist Perspective (MN Srinivas), Marxist Perspective (AR Desai)	9
3	Contemporary Changes in Indian Society	Changes in rural and urban society, impact of green revolution and liberalisation in transforming Indian Society	8

4	Indian Sociological Perspectives - II	Subaltern perspective, Feminist Perspective and Dalit Perspective	9
5	Concerns of contemporary Indian Society	Identity Politics, Gender Inequality, Social Conflict, Environment and Development	8
Total number of hours			**42**

Evaluation Criteria	
Components	**Maximum Marks**
T1	**20**
T2	**20**
End Sem	**35**
TA	**25 (Project, quiz, assignment)**
Total	**100**

Project Based Learning
Students will select a key event/movement/episode from Indian History and contemporary Indian period (1947 onwards) and will evaluate its impact on the socio-political, economic and cultural fabric of country.

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.	Bhaduri, Amit and Nayyar, Deepak. *The Intelligent Person's Guide to Liberalization*, Penguin Books India, New Delhi, 1996.
2.	Dubey, S.C. *Indian Society*, National Book Trust, New Delhi, 2001 (Reprint)
3.	Heehs, Peter. *India's Freedom Struggle 1857-1947: A short history,* Oxford University Press, New York, 1988.
4.	Centre for Science and Environment, *State of India's Environment: A citizens Report*, CSE, New Delhi, Updated ed.
5.	Srinivas, M. N., *Social Change in Modern India*, Orient Longman, New Delhi, 1995.

Syllabus

Course Code	24B12HS315	**Semester** ODD **(specify Odd/Even)**	**Semester** V **Session** 2024 -2025 **Month from** July-December
Course Name	**Civil Society, Political Regimes and Conflict**		
Credits	3	**Contact Hours**	**3-0-0**

Faculty (Names)	**Coordinator(s)**	Dr. Ila Joshi (62)
	Teacher(s) (Alphabetically)	Dr Ila Joshi

CO Code	**COURSE OUTCOMES**	**COGNITIVE LEVELS**
CO1	Demonstrate an understanding of the basic concepts and elements of civil society and its intersection with state and globalization.	Understanding (C2)
CO2	Compare the working of NGOs in various fields through their methods and strategies.	Applying (C3)
CO3	Analyze the contribution of civil society in Indian and global peace movements.	Analyzing (C4)
CO4	Evaluate the Gandhian notion on civil society and its relevance	Evaluating (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Understanding Civil Society	• Civil Society: Concepts and Perspectives • Elements of Civil Society • Civil Society in India • Role of Civil Society • Issues in the Working Civil Society Organizations	8 (CO2)
2.	Civil Society and the State	• State and Civil Society • Civil Society and Globalization: Resistance and Protest • Civil Society and Political Regimes	9 (CO2, CO3)
3.	Role of NGO's in Peace Process	• NGO: Definition and Types • Methods and Strategies Used by NGOs • Case Studies of Some Prominent NGOs	8 (CO3)
4	Civil Society and Peace Building	• Global Peace Movements • The Underlying Causes of Violence and War, Lasting World Peace • Peace Movements in India	8 (CO3, CO4)
5	Gandhian Civil Society for Global Peace	• Gandhian Notion of Civil Society • Gandhi, Capacity Building and Empowerment • Gandhian Civil Society and Globalization • Gandhian Civil Society for Global Peace	9 (CO5)

Total number of Lectures	42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Project/ Class Test/ Quiz)
Total	**100**

Project: Students are expected to evaluate the work of various NGOs and other civil society organizations in addressing the social problems. The projects will evaluate the role of civil society organizations in national and international peace building process.

Recommended Reading material:

1.	Asian Development Bank, Overview of Civil Society Organizations: India, retrieved from https://www.adb.org/publications/overview-civil-societyorganizations-india, November 1, 2017
2.	Bratton, Michael, 1994, Civil Society and Political Transition in Africa, Boston, MA: Institute for Development Research
3.	Angi, D. (2005). Beyond the Boundaries of Nation-State: Images of Global Civil Society. Polish Sociological Review. 149: 15-29.
4.	Chandhoke, N. (2002). The Limits of Global Society. In M.Glaus (Ed.). Global Civil Society. Oxford: Oxford University Press.
5.	Korten, D.C. 1990. Getting to the 21st Century: Voluntary Action and Global Agenda. West Hartford, CT: Kumarian
6.	Elliot, C., 'Some Aspect of Relations between the North and South in the NGO Practices', Annual Review of Anthropology 26:439-64, 1987.
7.	George, S. Jacob., Intra and Inter-State Conflicts in South Asia, South Asian Publishers, New Delhi, 2001
8.	Roger, C., A Just and Lasting Peace: The US Peace Movement from the Cold War to Desert Storm, The Noble Press, Chicago, 1991
9.	Abiew, F.K., and T.Keating. 2004. "Defining a Role for Civil Society". In Building Sustainable Peace. Ed. T. Keating and W.A.Knight, 93-117. Edmonton: University of Alberta Press.
10.	Shah, Ghanshyam and H.R. Chaturvedi., Gandhian Approach to Rural Development: The Valod Experiment, New Delhi: Ajanta Prakasha, 1983.

Detailed Syllabus

Course Code	16B1NMA533	**Semester** - Odd **(specify Odd/Even)**	**Semester** 5th **Session** 2024 -2025 **Month from** July - Dec 2024
Course Name	Matrix Computations		
Credits	3	**Contact Hours**	3-0-0

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	recall the basics of matrix theory and system of linear equations.	Remembering Level(C1)
C301-3.2	explain matrix inversion by partitioning/elementary matrices, vector spaces, inner product spaces and matrix norms.	Understanding Level (C2)
C301-3.3	solve the system of linear equations and eigen value problems using direct and iterative methods.	Applying Level (C3)
C301-3.4	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**

Project Based Learning: Each student in a group of 3-5 students will apply the concepts of matrix calculus to solve discrete dynamical systems and a system of differential equations arising in various disciplines.

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, 4^{th} Edition, Johns Hopkins University Press, 2013.
3.	**Datta, K. B.**, Matrix and Linear Algebra, 3rdEdition, Prentice Hall of India, 2016.
4.	**David, W. Lewis**., Matrix Theory, World Scientific, 1991.

Course Description

Course Code	17B1NMA531	**Semester** - Odd	**Semester** V **Session** 2024-25 **Month from** July- Dec 2024
Course Name	Basic Numerical Methods		
Credits	3	**Contact Hours**	3-0-0
Faculty (Names)	**Coordinator(s)**	Dr. Dinesh C. S. Bisht	
	Teacher(s) (Alphabetically)	Dr. Dinesh C. S. Bisht	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above-mentioned course, the students will be able to:		
C301-5.1	relate the concepts of approximation, numerical solution, and errors in computation.	Remembering (C1)
C301-5.2	demonstrate the understanding of approximation and basic numerical methods	Understanding (C2)
C301-5.3	apply numerical methods for interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations	Applying (C3)
C301-5.4	analyse the physical problem to establish mathematical model and use appropriate method to solve	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Approximation and Errors in Computation	Errors, relative error, absolute error, error in series approximation.	02
2.	Algebraic and Transcendental Equations	Bisection Method, Regula- Falsi Method, Secant Method, Iterative method, Newton-Raphson Method, convergence.	07
3.	Interpolation	Finite Differences, Relation between difference operators, Newton's Forward and Backward Interpolation, Gauss Backward Interpolation, Bessel's and Sterling's central difference operators, Laplace-Everett's formula, Newton's divided difference formula, Lagrange's interpolation formula.	08
4.	Numerical Differentiation and Integration	Derivatives using Newton's Forward and Backward Interpolation, Bessel's and Sterling's central difference operators, Maxima and minima of a tabulated function. Trapezoidal,	11

		Simpson's, Boole's and Weddle's rules, Euler-Maclaurin formula.	
5.	System of Linear Equations	Gauss Elimination method, LU decomposition method, Gauss-Seidel Method.	05
6.	Numerical Solution of Ordinary Differential Equations	Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method, Milne's method for first order, second order and simultaneous differential equations, Finite-Difference Method	09
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**

Project Based Learning: Students will be divided in a group of 4-5 to collect literature and submit a report on application of different numerical methods to solve practical problems based on systems of linear equations and ordinary differential equations.

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.	**C. F. Gerald and P.O. Wheatley,** Applied Numerical Analysis, 7^{th} Ed., Pearson Education, 2004.
2.	**M. K. Jain, S. R. K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation, 6^{th} Ed., New Age International, New Delhi, 2014.
3.	**R. S. Gupta,** Elements of Numerical Analysis, 2^{nd} Ed., Cambridge University Press, 2015.
4.	**S.D. Conte and C. deBoor,** Elementary Numerical Analysis, An Algorithmic Approach, 3^{rd} Ed., McGraw-Hill, New York, 1980.