

Detailed Syllabus
Lab-wise Breakup

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

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

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

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

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

Evaluation Criteria

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

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

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

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

Detailed Syllabus
Lecture-wise Breakup

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

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

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

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

| | | | |
|----|---|---|-----|
| | | Indexing techniques, Interrupt System of 8085, Polling & Interrupt, Basic definition of Interrupts, Interrupt Structure & their types, Masking/Unmasking of Interrupts, Interrupt driven I/O, Microprocessor (8086, 80186, 80286, etc.), Architecture Advancement of <i>Programming Examples</i> | |
| 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, <i>Programming Examples</i> . | 12L |
| 4. | Real World Interfacing with Microcontroller | Interfacing of single LED, Blinking of LED with timer and without timer, Interfacing of push-button, LED & 7-segment display, Intelligent LCD Display, Interfacing of intelligent LCD display, Interfacing of Matrix Keyboard to control 7-segment display, Stepper Motor & DC Motor, Interfacing with stepper & DC motor, Relay Interfacing, Different Sensor Interfacing, IR & LDR Sensor, DTMF, 8255 PPI Chip (Pin Configuration, Block Diagram, Operating Modes, Memory Mapped I/O & I/O Mapped I/O), Application of 8255 - 7 segment, Traffic Light Controller etc. | 10L |

Total number of Lectures 43 L

Evaluation Criteria

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

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

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

Detailed Syllabus
Lecture-wise Breakup

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

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

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

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

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

Evaluation Criteria

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

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

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

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

Detailed Syllabus
Lecture-wise Breakup

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

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|------------------------|------------------------------------|--|
| Faculty (Names) | Coordinator(s) | Ashish Gupta, Monika |
| | Teacher(s) (Alphabetically) | Ashish Gupta, K. Nisha, Monika, Raghvendra Kumar Singh, Reema Budhiraja, |

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

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

| | | |
|--|--|-----------|
| | intensity, directivity and power gain. | |
| Total number of Lectures | | 42 |
| Evaluation Criteria | | |
| Components | Maximum Marks | |
| T1 | 20 | |
| T2 | 20 | |
| End Semester Examination | 35 | |
| TA | 25 | |
| Total | 100 | |
| <p>Project Based Learning: Students will learn to derive the wave equations of waveguide which will help them to design the rectangular waveguide for any operating frequency in the X-Band. They will be also able to conduct different experiments based on the waveguide and subsequently design on the EDA tools such as HFSS. They will also study the different antenna parameters which will enable them for design various kind of Antennas on EDA Tools. It will make them enable to make different projects to cope up with the current challenges.</p> | | |

| | |
|---|---|
| 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, <i>Principles of Electromagnetics</i> , Oxford Press, 6 th Edition, 2016. |
| 2. | W. H. Haytt, J.A. Buck, M. J. Akhtar, <i>Engineering Electromagnetics</i> , McGraw Hill Education, 8 th Edition, 2014. |
| 3. | S. Salivahanan, S. Karthie, <i>Electromagnetic Field Theory</i> , McGraw-Hill Education, 2 nd Edition, 2019. |
| 4. | C.A. Balanis, <i>Advanced Electromagnetics</i> , Wiley Publishers, 2 nd Edition, 2012. |
| 5. | S.C. Mahapatra, S. Mahapatra, <i>Principles of Electromagnetic</i> , McGraw Hill Education, 2 nd Edition, 2015. |
| 6. | A.R. Harish, M.Sachidananda, <i>Antennas and Wave Propagation</i> , Oxford University Press, 2015. |

Detailed Syllabus Lab-wise Breakup

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

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

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

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

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

Evaluation Criteria

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

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

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

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

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

Detailed Syllabus

Lab-wise Breakup

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

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

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

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

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

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

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

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

Detailed Syllabus Lab-wise Breakup

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

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

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

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

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

MID Evaluation:

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

Final Evaluation:

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

Report:

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

Detailed Syllabus
Lecture-wise Breakup

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

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

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

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

| Total number of Lectures | | 42 |
|--|---|-----------|
| Evaluation Criteria | | |
| Components | Maximum Marks | |
| T1 | 20 | |
| T2 | 20 | |
| End Semester Examination | 35 | |
| TA | 25 (Attendance (10), Mini-Project (5), Tutorial (5) Quiz (5)) | |
| Total | 100 | |
| Project based learning: Groups of 2-3 students will choose a project topic. They will use the concepts of DSA to execute their project. In a team, they will learn how to apply the concepts for problem solving in a meaningful way. The knowledge gained will enhance their employability in the IT sector. | | |

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

Detailed Syllabus

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

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

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

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

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

Evaluation Criteria

| Components | Maximum Marks |
|------------|---------------|
|------------|---------------|

| | |
|------------------------------------|----|
| Lab Test 1 | 20 |
| Lab Test 2 | 20 |
| Day-to-Day Evaluations | 15 |
| Mini-Project | 15 |
| Day-to-Day - Attendance Assignment | 15 |

| | |
|--------------|------------|
| Total | 100 |
|--------------|------------|

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

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

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

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

Detailed Syllabus
Lecture-wise Breakup

| | | | |
|--------------------|--------------------------|----------------------|---|
| Course Code | 15B1NHS434 | Semester: Odd | Semester V Session 2021-2022 Month from Sep 2021 to Dec 2021 |
| Course Name | Principles of Management | | |
| Credits | 3 | Contact Hours | 3-0-0 |

| | | |
|------------------------|--|--|
| Faculty (Names) | Coordinator(s) | Dr. Deepak Verma (deepak.verma@jiit.ac.in) |
| | Teacher(s) (Alphabetically) | Dr. Deepak Verma |

| COURSE OUTCOMES | | COGNITIVE LEVELS |
|------------------------|--|--------------------------|
| C206-2.1 | Describe the functions, roles and skills of managers and illustrate how the manager's job is evolving. | Understanding Level (C2) |
| C206-2.2 | Examine the relevance of the political, legal, ethical, economic and cultural environments in global business. | Analyzing Level (C4) |
| C206-2.3 | Evaluate approaches to goal setting, planning and organizing in a variety of circumstances. | Evaluating Level (C5) |
| C206-2.4 | Evaluate contemporary approaches for staffing and leading in an organization. | Evaluating Level (C5) |
| C206-2.5 | Analyze contemporary issues in controlling for measuring organizational performance. | Analyzing Level (C4) |

| Module No. | Title of the Module | Topics in the Module | No. of Lectures for the module |
|-------------------|---|--|---------------------------------------|
| 1. | Introduction to Managers and Management | Management an Overview: Introduction, Definition of Management, Role of Management, Functions of Managers, Levels of Management, Management Skills and Organizational Hierarchy, Social and Ethical Responsibilities of Management: Arguments for and against Social Responsibilities of Business, Social Stakeholders, Measuring Social Responsiveness and Managerial Ethics, Omnipotent and Symbolic View, Characteristics and importance of organizational culture, Relevance of political, legal, economic and Cultural environments to global business, Structures and techniques organizations use as they go international. | 10 |
| 2. | Planning | Nature & Purpose, Steps involved in Planning, Objectives, Setting Objectives, Process of Managing by Objectives, Strategies, Policies & Planning Premises, Competitor Intelligence, Benchmarking, Forecasting, Decision-Making. | 8 |
| 3. | Organizing | Nature and Purpose, Formal and Informal Organization, Organization Chart, Structure and Process, Departmentalization by difference strategies, Line and Staff authority- Benefits and Limitations-De-Centralization and Delegation of Authority Versus, Staffing, Managerial Effectiveness. | 10 |
| 4. | Directing | Scope, Human Factors, Creativity and Innovation, Harmonizing Objectives, Leadership, Types of Leadership Motivation, Hierarchy of Needs, Motivation theories, | 6 |

| | | | |
|---------------------------------|-------------|---|-----------|
| | | Motivational Techniques, Job Enrichment, Communication, Process of Communication, Barriers and Breakdown, Effective Communication, Electronic media in Communication. | |
| 5. | Controlling | System and process of Controlling, Requirements for effective control, The Budget as Control Technique, Information Technology in Controlling, Productivity, Problems and Management, Control of Overall Performance, Direct and Preventive Control, Reporting, The Global Environment, Globalization and Liberalization, International Management and Global theory of Management. | 8 |
| Total number of Lectures | | | 42 |

Project Based Learning: Students are supposed to form a group (Maximum 6 students in each group) and identify an Organization. Identified organization has to be unique and no other group can choose the similar organization of the same batch. Students are supposed to do the in-depth study of the organization and submit the detailed report on basic introduction (includes Mission, Objectives, goals of an organization), Organization structure and design, globalization strategy, departmentalization, products/services, Management approach (Centralized/Decentralized), Formalization and any other relevant information pertaining to the organization. Students are supposed to identify one past project of this organization and explain it in terms of management functions such as Planning, Organizing, Leading and Controlling. After the report submission viva will happen for each group.

Evaluation Criteria

| Components | Maximum Marks |
|--------------------------|--------------------------------|
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 (Project, Quiz, Attendance) |
| 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. | Koontz H, Weihrich H. Essentials of management: an international, innovation, and leadership perspective. McGraw-Hill Education; 10 th Edition 2018. |
| 2. | Tripathi PC. Principles of management. Tata McGraw-Hill Education; 6 th Edition 2017. |
| 3. | Principles of Management Text and Cases, Pravin Durai , Pearson ,2015 |
| 4. | Robbins, S.P. & Decenzo, David A. Fundamentals of Management, 7 th ed., Pearson, 2010 |
| 5. | Robbins, S.P. & Coulter, Mary Management; 14 ed., Pearson , 2009 |

Detailed Syllabus
Lecture-wise Breakup

| | | | |
|------------------------|--|---------------------------------------|--|
| Course Code | 16B1NHS433 | Semester: Odd | Semester: Session 2021-2022 Month from: August to Dec |
| Course Name | Financial Management | | |
| Credits | 3 | Contact Hours | 3 (3-0-0) |
| Faculty (Names) | Coordinator(s) | Dr. Sakshi Varshney, Dr. Shirin Alavi | |
| | Teacher(s) (Alphabetically) | Dr. Sakshi Varshney, Dr. Shirin Alavi | |

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

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

| | | | |
|---------------------------------|---|--|-----------|
| 8. | Leverages and Capital structure decision and Working Capital Management | Break Even Analysis, Operating, Financial and combined leverage, Capital structure EBIT- EPS analysis, Concept of working capital management, 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 | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 (Project+ Quiz+ Class participation) | |
| Total | | 100 | |

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

| | |
|--|---|
| Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
| 1. | Chandra, P., <i>Financial Management Theory and Practice</i> , 7th ed., Tata McGraw Hill, 2007. |
| 2. | Horne, J.C.V. and Wachowicz, J.M. <i>Fundamentals of Financial Management</i> , 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. <i>Financial Management: Text, Problems and Cases</i> , 8th ed., McGraw Hill Education, 2019. |
| 4. | Kishore, R.M., <i>Financial Management</i> , 6th ed, Taxmann, 2007. |
| 5. | Mukherjee, M and Hanif, M., <i>Financial accounting</i> , 8th ed., Tata McGraw Hill, 2008. |
| 6. | Pandey, I.M., <i>Financial management</i> , 11th ed, Vikas Publishing House Pvt Ltd, 2015 |

SYLLABUS AND EVALUATION SCHEME

| | | | |
|-------------------|-----------------------------------|--|---|
| CourseCode | 16B1NHS532 | Semester:ODD (specifyOdd/Even) | Semester: 5th Monthfrom: Aug to Dec, 2021 |
| CourseName | Planning and Economic Development | | |
| Credits | 03 | ContactHours | 3-0-0 |

| | | |
|------------------------|------------------------------------|--|
| Faculty (Names) | Coordinator(s) | Dr. Akarsh Arora |
| | Teacher(s) (Alphabetically) | Dr. Akarsh Arora(akarsh.arora@mail.jiit.ac.in) |

| COURSE OUTCOMES | | COGNITIVE LEVELS |
|-----------------|--|--------------------------|
| C303-4.1 | Understand the issues and approaches to economic development. | Understanding Level (C2) |
| C303-4.2 | Evaluate National income accounting, human development index and sustainable development. | Evaluating Level (C5) |
| C303-4.3 | Apply an analytical framework to understand the structural characteristics of development. | Applying Level (C3) |
| C303-4.4 | Analyze the role of Macroeconomic stability & policies and Inflation in the development process. | Analyzing Level (C4) |
| C303-4.5 | Evaluate the importance of federal development and decentralization. | Evaluating Level (C5) |

| Module No. | Title of the Module | Topics in the Module | No. of Lectures for the module |
|------------|--|---|--------------------------------|
| 1. | Economic Development and its Determinants | Economic growth and development. Indicators of development. Approaches to economic development. Rostows Stages of Growth. | 5 |
| 2. | National Income Accounting | National Income Accounting, Green GNP and Sustainable development | 5 |
| 3. | Indicators of development | PQLI, Human Development Index (HDI) and gender development indices. | 4 |
| 4. | Demographic Features, Poverty and Inequality | Demographic features of Indian population; Rural-urban migration; Growth of Primary, Secondary and Tertiary Sector. | 5 |
| 5. | Inflation and Business Cycles | Inflation. Business cycle. Multiplier and Accelerator Interaction. | 6 |
| 6. | Macro-Economic Stability & Policies | Monetary Policy. Fiscal Policy. Role of Central Bank & Commercial banks in the development of the country. Balance of payments; currency convertibility and Issues in export-import policy. | 6 |

| | | | |
|---------------------------------|--------------------------|---|-----------|
| 7. | Federal Development | The Federal Set-up - The Financial Issues in a Federal Set-up, Principles for Efficient Division of Financial Resources between Governments. Financial Federalism under Constitution. Finance Commissions in India, Terms of References and its Recommendations | 6 |
| 8. | Planning and Development | Need for planning, Decentralisation, Rural and Urban local bodies. | 5 |
| Total number of Lectures | | | 42 |

Evaluation Criteria

| Components | Maximum Marks |
|--------------------------|------------------------|
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 (Assignment + Quiz) |
| Total | 100 |

Project-based Learning: Each student in a group of 4-5 will opt a topic and submit a report related to India's Development Indicators based on following parameters; National Income, State Income, Human Development Index (HDI), Gender Development Indices (GDI), Demographic Profile, Migration, Sectoral contributions of income and employment, Poverty, Income Inequality & literacy, Federal Structure, Budgetary estimates, Tax and Monetary Policy, Distribution of financial resources from central to state to local bodies. Understanding fundamental development indicators will upgrade student's knowledge on various Economic Development front and improve mechanism to formula suitable policy design, which further strengthen their employability into public and private decision-making body.

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. | Todaro, M.P., Stephen C. Smith, Economic Development, Pearson Education, 2017 |
| 2. | Thirwal, A.P., Economics of Development, Palgrave, 2011 |
| 3. | Ahuja, H. L., Development Economics, S Chand publishing, 2016 |
| 4. | Ray, Debraj, Development Economics, Oxford University Press, 2016 |
| 5. | Meier, G.M., Leading Issues in Economic Development, Oxford University Press, New Delhi, 2008 |
| 6. | Ahuja, H. L., Development Economics, S Chand publishing, 2016 |
| 7. | Benavot, Aaron. "Education, gender, and economic development: A cross-national study." Sociology of education (1989): 14-32. |
| 8. | Falk, Armin, and Johannes Hermle. "Relationship of gender differences in preferences to economic development and gender equality." Science 362, no. 6412 (2018). |

Detailed Syllabus
Lecture-wise Breakup

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

| | | |
|------------------------|------------------------------------|-----------------------|
| Faculty (Names) | Coordinator(s) | Dr Badri Bajaj |
| | Teacher(s) (Alphabetically) | Dr Badri Bajaj |

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

| Module No. | Subtitle of the Module | Topics in the module | No. of Lectures for the module |
|---------------------------------|--|--|---------------------------------------|
| 1. | Entrepreneurial perspective | Foundation, Nature and development of entrepreneurship, importance of entrepreneurs, Entrepreneurial Mind, Individual entrepreneur Types of entrepreneurs, Entrepreneurship in India | 8 |
| 2. | Beginning Considerations | Creativity and developing business ideas; Creating and starting the venture; Building a competitive advantage; Opportunity recognition, Opportunity assessment; Legal issues | 14 |
| 3. | Developing Marketing Plans | Developing a powerful Marketing Plan, E-commerce, Integrated Marketing Communications | 6 |
| 4. | Developing Financial Plans | Sources of Funds, Managing Cash Flow, Creating a successful Financial Plan Developing a business plan | 11 |
| 5. | Leading Considerations | Developing Team, Inviting candidates to join team, Leadership model | 3 |
| Total number of Lectures | | | 42 |
| Evaluation Criteria | | | |
| Components | Maximum Marks | | |
| T1 | 20 | | |
| T2 | 20 | | |
| End Semester Examination | 35 | | |
| TA | 25 (Assignment, Project , Class Participation, Attendance) | | |
| Total | 100 | | |

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

| Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
|---|--|
| 1. | Robert D Hisrich, Michael P Peters & Dean A Shepherd, “Entrepreneurship” 10 th 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”, 2 nd Edition, Oxford University Press, 2011 |
| 4. | Sangeeta Sharma, “Entrepreneurship Development”, 1 st 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

Web Technology (I2CS322) B.Tech. ECE (minor)- V Semester

| | | | |
|---------------------|----------------|----------------------|--|
| Subject Code | 21B12CS322 | Semester: Odd | Semester: V Session 2020-21 Month: July to Dec 2021 |
| Subject Name | Web Technology | | |
| Credits | 3 | Contact Hours | 3 |

| | | |
|------------------------|-----------------------|---|
| Faculty (Names) | Coordinator(s) | Dr. Naveen Kumr Gupta (62), Dr. Shailesh Kumar(128) |
| | Teacher(s) | Dr. Naveen Kumar Gupta |

COURSE OUTCOMES: At the completion of the course, students will be able to

| S.NO | DESCRIPTION | COGNITIVE LEVEL (BLOOMS TAXONOMY) |
|-------------|---|--|
| C316.1 | Designing web pages using basic building blocks of web development. | Applying Level (C3) |
| C316.2 | Understand Advanced Java Scripting and related the web development concepts | Understanding Level (C2) |
| C316.3 | Apply functional aspects of database handling to create database using PHP | Applying Level (C3) |
| C316.4 | Understand React JS, Node JS for event-driven programming concepts | Understanding Level (C2) |
| C316.5 | Using famous web development frameworks to build web applications | Understanding Level (C2) |

Course Description:

| Module No. | Subtitle of the Module | Topics in the module | CO |
|-------------------|---|---|------------------|
| 1. | Review of Essential topics in Web Development | HTML, CSS,JavaScript Basics, Primitives, Functions, Objects, Event-Driven Programming,Callbacks, Javascript, DOM Manipulation | CO316.1, CO316.2 |

| | | | |
|----|----------------------------|--|---------|
| 2. | Databases and PHP | Overview of MYSQL. PHP: Starting to script on server side, Arrays, function and forms, advance PHP. Databases: Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs, Database Connectivity with PHP | CO316.3 |
| 3. | Programming in React JS | Understanding SPA, React Overview, React vs Angular ,React Deep-Dive, Composition over Inheritance, Declarative code with JSX, Unidirectional Data Flow, Components, Life Cycle, React Router, Handling States of the UI | CO316.4 |
| 4. | Programming in Node JS | Introduction to Node JS, Event Loop, REPL, Modules, REST, Scaling ,Use of API(Basics) | CO316.4 |
| 5. | Web Development Frameworks | Developing web applications using Django, Flask etc. | CO316.5 |

Project based learning: A group of 4-5 students will develop a web application using any of the web technologies (either single or in combination) covered as part of this course. Students will be required to develop a secure web application having countermeasures implemented against web hacks like XSS, CSRF, injection attacks, DOS attacks etc. Building a web application using advanced JS scripting and/ or web frameworks, while handling the various facets of cyber security will give students hands on experience of working in the area of web technology and cyber security. The knowledge gained will enhance their employability in the IT sector.

| Evaluation Criteria | |
|----------------------------|----------------------|
| Components | Maximum Marks |
| T1 | 20 |
| T2 | 20 |
| End Sem | 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)

| Text Books | |
|------------------------|---|
| 1. | https://www.robinwieruch.de/the-road-to-learn-react (The Road to learn React – by robin wieruch) |
| 2. | Matt Bishop, Computer Security: Art and Science, Addison-Wesley Educational Publishers Inc, 2003. |
| 3. | Brad Dayley , Brendan Dayley et al., Node.js, MongoDB and Angular Web Development: The definitive guide to using the MEAN stack to build web applications (Developer's Library), 2 nd , Addison-Wesley Educational Publishers Inc, 2018. |
| 4 | Chris Northwood,The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer,Apress, 2018. |
| Reference Books | |
| 1 | Vasan Subramanian, Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, 2 nd ,Apress, 2019. |
| 2. | William Stallings, Lawrie Brown, Computer Security, Principles And Practice, 4 th , Pearson Education, 2018. |
| 3 | Dr. David Basin, Applied Information Security, Springer, 2011. |
| 4 | Douglas R. Stinson,Cryptography Theory and Practice, 3 rd , CRC Press, 2005. |

Course Description

Web Technology Lab (21B16CS323) ECE (Minor)- V Semester

| | | | |
|--------------------|--------------------|---|---|
| Course Code | 21B16CS323 | Semester: Odd (specify Odd/Even) | Semester: V Session: 2020-21 Month: July To Dec 2021 |
| Course Name | Web Technology Lab | | |
| Credits | 1 | Contact Hours | 2 |

| | | |
|------------------------|-----------------------|--|
| Faculty (Names) | Coordinator(s) | Dr. Naveen Kumar Gupta (62), Dr. Shailesh Kumar(128) |
| | Teacher(s) | Dr. Naveen Kumar Gupta & Dr. Jyoti |

COURSE OUTCOMES: At the completion of the course, students will be able to

| S.NO | DESCRIPTION | COGNITIVE LEVEL (BLOOMS TAXONOMY) |
|-------------|--|--|
| C376.1 | Apply the fundamental elements of Web development in design of web pages | Applying Level (C3) |
| C376.2 | Understand the web development concepts built on Advanced Java Scripting | Understanding Level (C2) |
| C376.3 | Apply functional aspects of database handling to create database using PHP | Applying Level (C3) |
| C376.4 | Understand event-driven programming using React JS, Node JS | Understanding Level (C2) |
| C376.5 | Use the popular web development frameworks to build web applications | Understanding Level (C2) |

Course Description:

| Module No. | Subtitle of the Module | Topics in the module | CO |
|-------------------|-------------------------------|-----------------------------|-----------|
|-------------------|-------------------------------|-----------------------------|-----------|

| | | | |
|----|---|--|------------------|
| 1. | Review of Essential topics in Web Development | HTML, CSS, JavaScript Basics, Primitives, Functions, Objects, Event-Driven Programming, Callbacks, Javascript, DOM Manipulation | CO376.1, CO376.2 |
| 2. | Databases and PHP | Overview of MYSQL. PHP: Starting to script on server side, Arrays, function and forms, advance PHP. Databases: Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs, Database Connectivity with PHP | CO376.3 |
| 3. | Programming in React JS | Understanding SPA, React Overview, React vs Angular, React Deep-Dive, Composition over Inheritance, Declarative code with JSX, Unidirectional Data Flow, Components, Life Cycle, React Router, Handling States of the UI | CO376.4 |
| 4. | Programming in Node JS | Introduction to Node JS, Event Loop, REPL, Modules, REST, Scaling, Use of API(Basics) | CO376.4 |
| 5. | Web Development Frameworks | Developing web applications using Django, Flask etc. | CO6 |

Project based learning: A group of 4-5 students will develop a web application using any of the web technologies (either single or in combination) covered as part of this course. Students will be required to develop a secure web application having countermeasures implemented against web hacks like XSS, CSRF, injection attacks, DOS attacks etc. Building a web application using advanced JS scripting and/ or web frameworks, while handling the various facets of cyber security will give students hands on experience of working in the area of web technology and cyber security. The knowledge gained will enhance their employability in the IT sector.

| Evaluation Criteria | |
|--|---|
| Components | Maximum Marks |
| Lab Viva-1 | 20 |
| Lab Viva-2 | 20 |
| Day to Day | 60 |
| 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) | |
| | Text Books |
| 1. | https://www.robinwieruch.de/the-road-to-learn-react (The Road to learn React – by robin wieruch) |
| 2. | Matt Bishop, Computer Security: Art and Science, Addison-Wesley Educational Publishers Inc, 2003. |
| 3. | Brad Dayley , Brendan Dayley et al., Node.js, MongoDB and Angular Web Development: The definitive guide to using the MEAN stack to build web applications (Developer's Library), 2 nd , Addison-Wesley Educational Publishers Inc, 2018. |
| 4 | Chris Northwood,The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer,Apress, 2018. |
| | Reference Books |
| 1. | Vasan Subramanian, Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, 2 nd ,Apress, 2019. |
| 2. | William Stallings, Lawrie Brown, Computer Security, Principles And Practice, 4 th , Pearson Education, 2018. |
| 3. | Dr. David Basin, Applied Information Security, Springer, 2011. |
| 4. | Douglas R. Stinson,Cryptography Theory and Practice, 3 rd , CRC Press, 2005. |

Detailed Syllabus Lecture-wise Breakup

| | | | |
|------------------------|------------------------------------|--|---|
| Subject Code | 21B19CS211 | Semester: (specify Odd/Even) | Semester ODD Session 2021-2022 Month from July'21 to Dec'21 |
| Subject Name | Programming Fundamentals | | |
| Credits | 1 | Contact Hours | 1 |
| Faculty (Names) | Coordinator(s) | Purtee Kohli | |
| | Teacher(s) (Alphabetically) | Purtee Kohli | |

| | COURSE OUTCOMES | COGNITIVE LEVELS |
|-----|---|--------------------------|
| CO1 | Explain various data types, constructs of conditional programming and programming by loops | Understanding Level (C2) |
| CO2 | Explain need of array and structures | Understanding Level (C2) |
| CO3 | Apply and implement functions with or without pointers for different problems | Applying Level (C3) |
| CO4 | Write programs in C++ to implement OOPs concepts related to objects, classes, constructor, destructor, and friend function. | Applying Level (C3) |
| CO5 | Write programs in C++ using OOPs concept like encapsulation, inheritance, polymorphism, abstraction, stacks, queues, searching and sorting. | Applying Level (C3) |

| Module No. | Subtitle of the Module | Topics in the module | No. of Lectures |
|-------------------|--|---|------------------------|
| 1 | C Programming Fundamentals | Datatypes, Conditional Statements: IF, IF-ELSE, ESLEIF, Switch-Case, Looping: FOR, WHILE, DO-WHILE. | 2 |
| 2 | Structures, Pointers & Arrays | Structure Definition, Structure Handling, Introduction to Pointers, Arrays. | 2 |
| 3 | C Programming Functions | Function Definition, Function Declaration, Call by Value, Call by Reference, Recursions. | 1 |
| 4 | Object Oriented Fundamentals using C++ | Objects, Classes, Methods, implementing functions in the class, use of scope resolution operator, Access Modifiers, static functions and static data members, constructor and destructors, | 2 |
| 5 | OOP Advanced Concepts | Inheritance: single, multiple, multi-level and hybrid, Polymorphism: function and operator overloading, virtual member functions, abstract base classes and pure virtual functions, Introduction to SDLC. | 3 |
| 6 | Basic Data Structures using C | Stacks, Stack, Queue (array-based implementation). Circular Queue and Deque using array, 1D-Linked list, 2D-Link list application, Binary trees, Binary tree Implementation: array and pointer based | 2 |
| 7 | Searching & Sorting | Searching Techniques: Linear Search, Binary Search; Sorting: Bubble Sort, Insertion Sort, Selection Sort. | 2 |

| | | |
|--|--|-----------|
| Total number of Labs | | 14 |
| 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 | Herbert Schildt. “The Complete Reference C++ ”, 4th Edition, TMH, 2017 | |
| 2 | Yashavant P Kanetkar, ”Let Us C” (2016). BPB Publications, 15 th Edition. | |
| 3 | Herbert Schildt. “The Complete Reference C ”, 4th Edition, TMH, 2017 | |
| 4 | E Balaguruswamy , Object Oriented Programming With C++ , 7th Edition , TMH, 2017 | |

Detailed Syllabus Lecture-wise Breakup

| | | | |
|------------------------|------------------------------------|--|---|
| Subject Code | 21B19CS212 | Semester: (specify Odd/Even) | Semester ODD Session 2021-2022 Month from July'21 to Dec'21 |
| Subject Name | Programming Fundamentals Lab | | |
| Credits | 1 | Contact Hours | 2(Lab) |
| Faculty (Names) | Coordinator(s) | Purtee Kohli | |
| | Teacher(s) (Alphabetically) | Purtee Kohli | |

| | COURSE OUTCOMES | COGNITIVE LEVELS |
|-----|---|--------------------------|
| CO1 | Explain various data types, constructs of conditional programming and programming by loops | Understanding Level (C2) |
| CO2 | Explain need of array and structures | Understanding Level (C2) |
| CO3 | Apply and implement functions with or without pointers for different problems | Applying Level (C3) |
| CO4 | Write programs in C++ to implement OOPs concepts related to objects, classes, constructor, destructor, and friend function. | Applying Level (C3) |
| CO5 | Write programs in C++ using OOPs concept like encapsulation, inheritance, polymorphism, abstraction, stacks, queues, searching and sorting. | Applying Level (C3) |

| Module No. | Subtitle of the Module | Topics in the module | No. of Lab |
|-------------------|--|---|-------------------|
| 1 | C Programming Fundamentals | Datatypes, Conditional Statements: IF, IF-ELSE, ESLEIF, Switch-Case, Looping: FOR, WHILE, DO-WHILE. | 2 |
| 2 | Structures, Pointers & Arrays | Structure Definition, Structure Handling, Introduction to Pointers, Arrays. | 2 |
| 3 | C Programming Functions | Function Definition, Function Declaration, Call by Value, Call by Reference, Recursions. | 1 |
| 4 | Object Oriented Fundamentals using C++ | Objects, Classes, Methods, implementing functions in the class, use of scope resolution operator, Access Modifiers, static functions and static data members, constructor and destructors, | 2 |
| 5 | OOP Advanced Concepts | Inheritance: single, multiple, multi-level and hybrid, Polymorphism: function and operator overloading, virtual member functions, abstract base classes and pure virtual functions, Introduction to SDLC. | 3 |
| 6 | Basic Data Structures using C | Stacks, Stack, Queue (array-based implementation). Circular Queue and Deque using array, 1D-Linked list, 2D-Link list application, Binary trees, Binary tree Implementation: array and pointer based | 2 |

| | | | |
|-----------------------------|---------------------|--|-----------|
| 7 | Searching & Sorting | Searching Techniques: Linear Search, Binary Search; Sorting: Bubble Sort, Insertion Sort, Selection Sort. | 2 |
| Total number of Labs | | | 14 |

| | |
|--|---|
| 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 | Herbert Schildt. "The Complete Reference C++ ", 4th Edition, TMH, 2017 |
| 2 | Yashavant P Kanetkar,"Let Us C" (2016). BPB Publications, 15 th Edition. |
| 3 | Herbert Schildt. "The Complete Reference C ", 4th Edition, TMH, 2017 |
| 4 | E Balaguruswamy , Object Oriented Programming With C++ , 7th Edition , TMH, 2017 |

Detailed Syllabus

Lecture-wise Breakup

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

| | | |
|------------------------|--|---------------|
| Faculty (Names) | Coordinator(s) | Anuraj Panwar |
| | Teacher(s) (Alphabetically) | Anuraj Panwar |

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

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

| | | | |
|---------------------------------|-----------------------|---|-----------|
| | Applications | Observables and Uncertainty Relations, No-cloning theorem, Pauli Spin Matrices. | |
| 3. | Potential problems | 1-D, 2-D, and 3-D potential problems (including infinite and finite square well). Tunneling, harmonic oscillator, separation in spherical polar coordinates, hydrogen atom, etc.), | 08 |
| 4. | 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 (07 M), Class Test, Quizzes, etc(07 M), Assignments in PBL mode (06 M), and Internal assessment (05 M)] |
| Total | 100 |

| Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
|--|---|
| 1. | The new quantum universe by Toney Hey and Patrick Walters, Cambridge University Press. |
| 2. | Quantum mechanics a new introduction by Kenichi Konishi and G Paffuti, OUP., 2009 |
| 3. | Quantum physics by Eyvind H Wichman (Berkeley Physics course Vol 4) Tata McGraw Hill 2008 |
| 4. | Elements of quantum computation and quantum communication by A Pathak, CRC Press 2013. |
| 5. | Introduction to Quantum Mechanics by David J. Griffiths, Second Edition, Pearson, 2015. |

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

Detailed Syllabus
Lecture-wise Breakup

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

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

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

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

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

Evaluation Criteria

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

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

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

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

Detailed Syllabus
Lecture-wise Breakup

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

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

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

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

| | | | |
|---------------------------------|--|---|-----------|
| | | length measurement, velocity measurement, Laser Tracking, Metrology and LIDAR. Lasers in medicines and surgery. Lasers in defense, Lasers in space sciences, Lasers in sensors. | |
| Total number of Lectures | | | 40 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 [Attendance (07 M), Class Test, Quizzes, <i>etc</i> (07 M), Assignments in PBL mode (06 M), and Internal assessment (05 M)] | |
| Total | | 100 | |

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

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

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

Detailed Syllabus
Lecture-wise Breakup

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

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

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

| Module No. | Title of the Module | Topics in the Module | No. of Lectures for the module |
|-------------------|---|---|---------------------------------------|
| 1. | Nuclear Constituents and their properties, Nuclear Forces | Rutherford scattering and estimation of nuclear size, Constituents of the nucleus and their properties, Nuclear Spin, Moments and statistics, Magnetic dipole moment, Electric quadrupole 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, Synchrotrons, Colliders. | 06 |
| 6. | Cosmic radiation and Elementary Particles | Cosmic radiation: Discovery of cosmic radiation, its sources and composition, Latitude effect, altitude effect and east-west asymmetry, secondary cosmic rays, cosmic ray shower, variation of cosmic intensity and Van Allen radiation belt. Elementary particles: Classification of particles, K-mesons, Hyperons, particles and antiparticles, fundamental interactions, conservation laws, CPT theorem, resonance particles and hypernucleus, Quark model. | 07 |
| Total number of Lectures | | | 40 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 [Attendance (07 M), Class Test, Quizzes, etc (07 M), Assignments in PBL mode (06 M), and Internal assessment (05 M)] | |
| Total | | 100 | |
| Project Base Learning | | Different groups of students with 5-6 students in each group may be formed and these groups may be given to complete a task like identifying common applications to nuclear science, recent developments in nuclear science, etc. The students may be asked to make presentations on topics like radioactive dating or nuclear models and their applications. Devices like linear accelerators, cyclotrons etc. may also be included. The students | |

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

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|---|---|---|---|
| Course Code | 16B1NMA531 | Semester Odd | Semester V Session 2021-22 Month from Aug 2021- Dec 2021 |
| Course Name | Discrete Mathematics | | |
| Credits | 3 | Contact Hours | 3-0-0 |
| Faculty (Names) | Coordinator(s) | Dr. Vipin Chandra Dubey | |
| | Teacher(s) (Alphabetically) | Dr. Vipin Chandra Dubey | |
| COURSE OUTCOMES: After the successful completion of this course, the student will be able to | | | COGNITIVE LEVELS |
| C301-1.1 | explain partial order relations, Hasse diagram, lattices and recursive functions. | | Understanding Level (C2) |
| C301-1.2 | solve the difference equations using generating function and Z-transform. | | Applying Level (C3) |
| C301-1.3 | explain the propositional and predicate calculus to check the validity of arguments. | | Understanding Level (C2) |
| C301-1.4 | demonstrate graphs, digraphs, trees and use it to solve the different problems of graph theory. | | Applying Level (C3) |
| C301-1.5 | illustrate various algebraic structures and their properties. | | Understanding Level (C2) |
| C301-1.6 | explain the theory of formal languages and solve the related problems of automata. | | Applying Level (C3) |
| Module No. | Title of the Module | Topics in the Module | No. of Lectures for the module |
| 1. | Relations and Lattices | Relations and their composition. Pictorial representation, matrix and graphical representations. Equivalence relations and partitions. Partial ordered relations and Hasse diagram. Lattices. | 5 |
| 2. | Functions | Functions and Recursively defined functions, generating functions, solution of recurrence relations by generating function. Z transforms, solution of difference equations by Z transform. | 8 |
| 3. | Propositional Calculus | Propositions- simple and compound. Basic logical operators. Implication. Truth tables. Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers. | 4 |
| 4. | Graphs | Graphs and related definitions, subgraphs, isomorphism, paths and connectivity. Eulerian graph and Konigsberg problem. Hamiltonian graph. Labelled and weighted graphs. Tree Graphs- Minimum spanning Tree (Prim's algorithm). Graph colorings. Four color problem. | 7 |
| 5. | Directed Graphs | Trees, Digraphs and related definitions. Rooted trees. Algebraic expressions and Polish notation. Sequential representation. Adjacency matrix. Path matrix. | 5 |

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| | | Shortest path. Linked representation of directed graphs. Binary trees. | |
| 6. | Algebraic Structures | Groups- definitions and examples, order of elements, subgroup, condition for subgroups. Quotient groups, Lagrange theorem and applications, Rings, integral domains and Fields- definition and examples. | 7 |
| 7. | Languages and Grammars | Strings (words) and languages, grammars, types of grammars, Finite state machines, finite state automata, regular languages and regular expressions. | 6 |
| Total number of Lectures | | | 42 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 (Quiz, Assignments, Tutorials, PBL) | |
| Total | | 100 | |
| Recommended Reading material: | | | |
| 1. | Lipschutz, S. and Lipson, M. , Discrete Mathematics, 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. | | |

Detailed Syllabus

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

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

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

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

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|---|---|--|-----------|
| 4. | Eigen value Problems | Eigen values and Eigenvectors, spectral radius, Greshgorin's theorem, Jacobi method, Givens rotations method and Householder's method, Power and Inverse power methods, Q-R algorithm. | 12 |
| 6. | Matrix Calculus | Powers and functions of matrices, application to solve discrete dynamical systems $x(t+1) = Ax(t)$, $x(0) = \alpha$ and a system of differential equations of the form $dx/dt = Ax$, $x(0) = \alpha$. | 8 |
| Total number of Lectures | | | 42 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 (Assignments, Quizzes and Tutorial) | |
| Total | | 100 | |
| Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | | | |
| 1. | Bronson, R. , Matrix Methods an Introduction, Academic Press, 1991. | | |
| 2. | Golub, G. H., Loan, C. F. V. , Matrix Computations, 4 th Edition, Johns Hopkins University Press, 2013. | | |
| 3. | Datta, K. B. , Matrix and Linear Algebra, 3rd Edition, Prentice Hall of India, 2016. | | |
| 4. | David, W. Lewis. , Matrix Theory, World Scientific, 1991. | | |

Course Description

| | | | |
|--|--|---|---|
| Course Code | 17B1NMA531 | Semester - Odd | Semester V Session 2021-22 Month from Aug 2021- Dec 2021 |
| Course Name | Basic Numerical Methods | | |
| Credits | 3 | Contact Hours | 3-0-0 |
| Faculty (Names) | Coordinator(s) | Prof. Lokendra Kumar & Dr. P. K. Srivastava | |
| | Teacher(s) (Alphabetically) | Dr. D .C. S. Bisht , Prof. Lokendra Kumar, Dr. P. K. Srivastava & Prof. R. C. Mittal, | |
| COURSE OUTCOMES | | | COGNITIVE LEVELS |
| After pursuing the above mentioned course, the students will be able to: | | | |
| C301-5.1 | explain the concepts of approximation and errors in computation. | | Understanding level (C2) |
| C301-5.2 | construct numerical methods for algebraic and transcendental equations and their convergence. | | Applying Level (C3) |
| C301-5.3 | outline the methods of interpolation using finite differences and divided difference formulas. | | Understanding level (C2) |
| C301-5.4 | make use of numerical differentiation and integration. | | Applying Level (C3) |
| C301-5.5 | solve the system of linear equations using direct and iterative methods. | | Applying Level (C3) |
| C301-5.6 | solve ordinary differential equations using different numerical methods. | | Applying Level (C3) |
| 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, Simpson's, Boole's and Weddle's rules, Euler-Maclaurin formula. | 11 |
| 5. | System of Linear Equations | Gauss Elimination method, LU decomposition method, Gauss-Seidel Method. | 05 |
| 6. | Numerical Solution of Ordinary Differential | 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 |

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|--|---|--|-----------|
| | Equations | | |
| 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 system 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. | | |

Course Description

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|------------------------|--|---|--|
| Course Code | 17B1NMA533 | Semester Odd | Semester V Session 2020-21 Month from July 2021- Dec 2021 |
| Course Name | Statistical Information Theory with Applications | | |
| Credits | 3 | Contact Hours | 3-0-0 |
| Faculty (Names) | Coordinator(s) | Dr. Amit Srivastava | |
| | Teacher(s) (Alphabetically) | Dr. Amit Srivastava | |
| COURSE OUTCOMES | | | COGNITIVE LEVELS |
| C301-8.1 | explain the notions of information, entropy, relative entropy and mutual information. | | Understanding Level(C2) |
| C301-8.2 | explain fuzzy sets and compare the various measures of discrepancy. | | Analyzing Level (C4) |
| C301-8.3 | develop and compare Shannon-Fano and Huffman source codes using measures of uncertainty. | | Analyzing Level (C4) |
| C301-8.4 | analyse the notion of distance measure in pattern recognition generated in Intuitionistic fuzzy environment. | | Analyzing Level (C4) |
| C301-8.5 | apply information theoretic concepts in encryption and decryption. | | Applying Level (C3) |
| 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 | 10 |

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|---|---|---|-----------|
| | | Introduction to Arithmetic Coding. rate distortion theory, Lossy Source coding. | |
| 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 | |
| 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, 3 rd Ed, Tata McGraw-Hill, 2016. | | |
| 2. | Jain, K. C., and Srivastava, A. , Information Theory & Coding, 3 rd 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 | | |

Logical Reasoning and Inequalities (18B12MA312)

Course Description

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|--|---|---|---|
| Course Code | 18B12MA312 | Semester Odd | Semester V Session 2021-22 Month from Aug 2021- Dec 2021 |
| 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 | interpret the mathematical foundation of various inequalities. | | Understanding level (C2) |
| C301-9.2 | examine inequalities in the field of information theory and cryptography. | | Analyzing level (C4) |
| C301-9.3 | apply the concepts of permutation and combination of multi sets in combinatorics. | | Applying level (C3) |
| C301-9.4 | apply special numbers in combinatorial and number theoretic problems. | | Applying level (C3) |
| C301-9.5 | explain the basic concepts of logical reasoning and solve related problems. | | Understanding level (C2) |
| 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 | Clocks, calendars, binary logic, seating arrangement, | 8 |

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|---|---|--|-----------|
| | Reasoning | blood relations, logical sequence, assumption, premise, conclusion, linear and matrix arrangement, Syllogism, Binary Logic, Logical sequence & 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 | |
| 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

| | | | |
|------------------------|------------------------------------|--|---|
| Subject Code | 16B1NHS432 | Semester: ODD | Semester V Session 2021-2022 Months: from August to December |
| Subject Name | POSITIVE PSYCHOLOGY | | |
| Credits | 3 | Contact Hours | (3-0-0) |
| Faculty (Names) | Coordinator(s) | Dr. Badri Bajaj | |
| | Teacher(s) (Alphabetically) | Dr. Badri Bajaj Ms. Shikha Kumari | |

| COURSE OUTCOMES | | COGNITIVE LEVELS |
|------------------------|---|-------------------------|
| C303-9.1 | Demonstrate an understanding of the various perspectives of positive psychology and apply them in day to day life | Apply Level (C3) |
| C303-9.2 | Examine various theories and models of happiness, well-being and mental health | Analyze Level (C4) |
| C303-9.3 | Recommend possible solutions for enhancing happiness, well-being and mental health | Evaluating Level (C5) |
| C303-9.4 | Evaluate interventions/strategies for overall positive functioning | Evaluating Level (C5) |

| 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- | 6 |

| | | | |
|------------------------------|-----------------------|--|-----------|
| | | Work & Unemployment; 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, Oral Questions, Attendance) | |
| 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 four modules and make and execute plan for achievement of their goals. Each student can take help from any other student in the class. Each student will make a presentation in the class and will also submit a project report.

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|---|
| Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) |
| Snyder, C.R., Lopez, S. J., & Pedrotti, J.T. (2011). Positive Psychology: The Scientific and Practical Explorations of Human Strengths. 2 nd Ed., Sage Publications |
| Wesley J. Chun (2014). Positive Psychology, 1 st Ed., Pearson |
| Dewe, P. & Cooper, C. (2012). Well-Being & Work: Towards a Balanced Agenda. Palgrave Macmillian:NY. |
| Vijay Parkash, Updesh Kumar, Archana. (2015). Positive Psychology: Applications in Work, Health and Well – Being. 1 st Ed., Pearson |

**Detailed Syllabus
Lecture-wise Breakup**

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

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

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

| Module No. | Subtitle of the Module | Topics in the module | No. of Hours for the module |
|-------------------|--------------------------------------|--|------------------------------------|
| 1. | Introducing Literary Theories | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • New Fiction: Graphic Novels, Cyberpunk • Non Fiction: Memoirs & Autobiographies, Biographies | 4 |
| 3. | Modern Retellings/ Children's Literature | <u>Cinderella (Poem) - Roald Dahl</u> | 3 |
| 4. | European Lit./Travel/ Memoir/ Spiritual Literature | <u>Eat, Pray & Love (Travelogue & cinematic adaptation)</u> | 4 |
| 5. | Written Communication Through Non-Fiction | <i>Personal Narratives (Diary, Blog, Memoirs, Travelogue)</i> | 4 |
| 6. | Commonwealth / Indian Literature | <u>Hayavadana(Short Play)- Girish Karnad</u> | 4 |
| 7. | Afro-American Lit/ Post Colonial Literature | <u>Sweetness (Short Story) – Toni Morrison</u> | 3 |
| 8 | Sci-fi (Cyberpunk) | <u>Neuromancer (Science Fiction) – William Gibson</u> | 4 |
| 9 | Canadian Literature/ Speculative Fiction | <u>The Penelopiad- Margaret Atwood</u> | 4 |
| Total number of Hours | | | 42 |

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

| Evaluation Criteria | |
|---|--|
| Components | Maximum Marks |
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 (Assignment, Project, Class Interaction) |
| Total | 100 |
| Recommended Reading material: | |
| Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
| 1. | M.H. Abrams, 'A Glossary of Literary Terms'. 7 th 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 21 st Century', 1 st 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. 1 st 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', 1 st Edition, The Berkley Publishing Group, New York, 1984. For online version http://index-of.es/Varios-2/Neuromancer.pdf |
| 9 | Margaret Atwood, 'The Penelopiad', 1 st Edition, Canongate Series, Knopf, Canada, 2005. For online version: https://www.langhamtheatre.ca/wp-content/uploads/2010/09/The-Penelopiad.pdf An interview with Atwood: https://www.youtube.com/watch?v=D5Wj_JQ6NhY |

Detailed Syllabus
Lecture-wise Breakup

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

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

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

| Module No. | Title of the Module | Topics in the Module | No. of Lectures for the module |
|-------------------|--|---|---------------------------------------|
| 1. | Introduction | Introduction to the Course | 1 |
| 2. | Theoretical Orientation | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Difference between tradition media and new media • New media as technology • New Information Technology (brief history in case of India) | 5 |
| 5. | | <ul style="list-style-type: none"> • Mediatization of Society | 5 |

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|---------------------------------|--|--|-----------|
| | Media & State | <ul style="list-style-type: none"> • Free-speech Media | |
| 6. | Consumption of Media and Media reception | <ul style="list-style-type: none"> • Social Actors as Audience/ Audience as market–Theory • Media effects: Media and representations (gender, ethnic)- the under-representation and misrepresentation of subordinate groups. • Media and the construction of reality: media logic and cultivation analysis theory • Information Society vs Informed Society • Cultural Consumption and Social Class | 9 |
| 7. | Media in Global Age | <ul style="list-style-type: none"> • Rise of Network Society- Manuel Castells • Global Media: impact of market & state • Global Perspectives: The world on our doorstep • Marketing and aesthetics in everyday life | 7 |
| Total number of Lectures | | | 42 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 (Project, Presentation and attendance) | |
| Total | | 100 | |

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

| | |
|---|---|
| Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
| 1. | Joseph Turow, <i>Media Today: An Introduction to Mass Communication</i> , 3 rd Ed., Taylor & Francis. UK. (2008). |
| 2. | JA Fisher 'High Art v/s Low Art, in Berys Nigel Gaut & Dominic Lopes (eds.), <i>The Routledge Companion to Aesthetics</i> . Routledge 2001 |
| 3. | G. Ritzer, 'McDonaldization of Society, <i>The Journal of American Culture</i> . Volume 6, Issue 1. (2001 [1983]) Pp. 100-107. |
| 4. | Manuel. Castells, 'Introduction', in <i>Rise of Network Society: The Information Age: Economy, Society and Culture</i> , 2 nd Ed (1996). |

Detailed Syllabus
Lecture-wise Breakup

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|--------------------|------------------------|----------------------|--|
| Course Code | 17B1NHS531 | Semester:Odd | Semester V Session 2021 -2022 Month from August- December |
| Course Name | Technology and Culture | | |
| Credits | 3 | Contact Hours | 3-0-0 |

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|------------------------|--|-----------------|
| Faculty (Names) | Coordinator(s) | Dr Swati Sharma |
| | Teacher(s) (Alphabetically) | Dr Swati Sharma |

| COURSE OUTCOMES | | COGNITIVE LEVELS |
|------------------------|---|-------------------------|
| C303-5.1 | Understand socio-cultural factors and their effect on individuals, organizations and the business environment | Applying (C2) |
| C303-5.2 | Appraise technological convergence and cultural divergence, relate the differences to the literature and suggest solutions | Evaluating (C5) |
| C303-5.3 | Interpret and communicate effectively in physical and virtual teams by evaluating appropriate concepts, logic and selecting the apt IT tools. | Evaluating (C5) |
| C303-5.4 | Evaluation of the theoretical knowledge to adapt to cultural differences in global work environment. | Evaluating (C5) |

| Module No. | Title of the Module | Topics in the Module | No. of Lectures for the module |
|------------|--|---|--------------------------------|
| 1. | Introduction | <ul style="list-style-type: none"> ▪ The Information Technology Revolution ▪ The concept of Network societies ▪ Technology and Culture-how cultural beliefs influence technology | 5 |
| 2. | Dimensions of Culture | <ul style="list-style-type: none"> ▪ Evolution of Culture ▪ Principal theories of Culture: Kluckhohn and Strodtbeck, Hofstede, Trompenaars and Schwartz ▪ Cultural Diversity and cross-cultural literacy | 6 |
| 3 | Levels of Culture | <ul style="list-style-type: none"> ▪ Levels of Culture ▪ Measurement of Culture | 5 |
| 4. | Cross cultural communication in physical and virtual teams | <ul style="list-style-type: none"> ▪ The Communication Process ▪ Language and Culture ▪ Non-Verbal Communication ▪ Barriers to Cross Cultural Understanding | 6 |
| 5. | Negotiation and Decision Making | <ul style="list-style-type: none"> ▪ Theories of Negotiation ▪ Negotiation and Intercultural Communication ▪ Decision making in cross cultural environment | 6 |

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|---|------------------------------|---|----|
| | | <ul style="list-style-type: none"> ▪ Expatriate Management | |
| 6. | Culture and Marketing | Culture and research Culture and Consumer behaviour <ul style="list-style-type: none"> ▪ Culture and Marketing | 7 |
| 7. | Cross Culture and Leadership | <ul style="list-style-type: none"> ▪ Leadership and Culture ▪ Theories of Culture centric leadership and their Global Relevance ▪ Developing Competencies for Global citizens ▪ Women as International Leaders ▪ Cross Cultural Training ▪ Ethical Guidelines for Global Citizens | 7 |
| Total number of Lectures | | | 42 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 (Projectand Oral Viva) | |
| Total | | 100 | |
| Project based learning: Students in group of 4-5 members are required to present a term paper exploring the influence of culture on diverse aspects of business, design and technology. | | | |

| | |
|---|---|
| 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. | Cateora, P. R., Meyer, R. B. M. F., Gilly, M. C., & Graham, J. L. (2020). <i>International marketing</i> . McGraw-Hill Education. |
| 2. | Coyle,D., <i>The Culture Code: The Secrets of Highly Successful Groups</i> , Bantam, 2018 |
| 3. | Fletcher, R., & Crawford, H. (2013). <i>International marketing: an Asia-Pacific perspective</i> . Pearson Higher Education AU. |
| 4. | Gerard Bannon, J. (red.). Mattock, <i>Cross-cultural Communication: The Essential Guide to International Business</i> .2003 |
| 5. | Maidenhead. <i>Riding the Waves of Culture: Understanding Cultural Diversity in Business</i> (2012).3rd edition. McGraw Hill. |
| 6. | Madhavan,S., <i>Cross Cultural Management: Concepts and Cases</i> (2 nd Ed),Oxfor University Press 2016. |
| 7. | Robertson, Ronald. <i>Globalization: Social theory and global culture</i> , London: Sage, 1992. |

Detailed Syllabus
Lecture-wise Breakup

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

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|------------------------|------------------------------------|--|
| Faculty (Names) | Coordinator(s) | Dr. Chandrima Chaudhuri |
| | Teacher(s) (Alphabetically) | <ul style="list-style-type: none"> • Dr. Chandrima Chaudhuri • Dr. Niti Mittal • Dr. Praveen Sharma • Dr. Swati Sharma |

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

| Module No. | Title of the Module | Topics in the Module | No. of Lectures for the module |
|-------------------|----------------------------|--|---------------------------------------|
| 1. | The Indian Constitution | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • The Executive: President, Prime Minister and Governor- appointment, powers and functions | 8 |

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|---------------------------------|--------------------------------|--|-----------|
| | | <ul style="list-style-type: none"> • The Legislature: Parliament and its components- Lok Sabha and Rajya Sabha (composition and functions) • The Judiciary: Supreme Court-composition, functions, appointment and jurisdiction | |
| 3. | Nature of Federalism in India | <ul style="list-style-type: none"> • 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 | 8 |
| 4. | Local Governance in India | <ul style="list-style-type: none"> • Urban local governance: Municipality-Structure & Functions • Rural Local governance: Panchayat-Organization and Powers • Civil Society: the participation of the people in local governance | 8 |
| 5. | Traditional knowledge | <ul style="list-style-type: none"> • Kautilya- Theory of state • Mandala theory • Saptanga theory | 6 |
| 6. | Challenges to Indian Democracy | <ul style="list-style-type: none"> • Caste as a critical factor in the Indian Constitution • Gender as critical to the process of Constitutionalization | 4 |
| Total number of Lectures | | | 42 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 (Attendance, Quiz, Project) | |
| Total | | 100 | |

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

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

| | |
|----|---|
| 1. | A.A. George, <i>Important Judgements that transformed India</i> , New Delhi: McGraw Hill, 2020 |
| 2. | B. Chakraborty, <i>Indian Constitution: Text, Context and Interpretation</i> , New Delhi: Sage Publications, 2017 |
| 3. | B.K.Sharma, <i>Introduction to the Constitution of India</i> , New Delhi: Prentice Hall of India, 2002 |
| 4. | M.Laxmikanth, <i>Indian Polity</i> , 6 th edition, Noida: McGraw Hill, 2019 |
| 5. | M.P.Singh and R. Saxena, R, <i>Indian Politics: Contemporary Issues and Concerns</i> , New Delhi: PHI Learning, 2008 |
| 6. | R. Kangle, <i>Arthashastra of Kautilya</i> , 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: 5 th Session: 2021 -2022 Month from: August-December |
| Course Name | Management Accounting | | |
| Credits | 03 | Contact Hours | 3-0-0 |

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

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

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

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|---------------------------------|--|--|-----------|
| 5. | Measurement of Cost behaviour | Cost drivers, Management influence on cost behaviour, Cost functions | 3 |
| 5. | Cost Management Systems and Activity-Based costing | Direct, Indirect cost; Cost allocation; Traditional and Activity Based costing systems | 4 |
| 6. | Relevant information for decision making | Relevant information for Pricing decisions and operational decisions | 7 |
| 6. | Budgetary Control | Introduction to budgets; Functional budgets, Master budget, Fixed and flexible budgets, Budgets as financial planning models | 4 |
| 7. | Standard Costing and Variance analysis | Standard costing system, Variance analysis | 3 |
| 8. | Management control systems and responsibility accounting | Management control system, Organizational goals, controllability and measurement of financial performance, measures of profitability, ROI or Economic profit | 3 |
| Total number of Lectures | | | 42 |
| Evaluation Criteria | | | |
| Components | | Maximum Marks | |
| T1 | | 20 | |
| T2 | | 20 | |
| End Semester Examination | | 35 | |
| TA | | 25 (assignments, class test, project) | |
| Total | | 100 | |

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

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

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