| Semester: IV | | |
|---|---|---|
| **Probability Theory, Complex variables and Optimization** | | |
| **Course Code:** | **MVJ21MA41D** | **CIE Marks: 50** |
| **Credits:** | **L: T:P:S: 2:2:0:0** | **SEE Marks: 50** |
| **Hours:** | **20L+20T** | **SEE Duration: 3 Hrs.** |
| **Course Learning Objectives: The students will be able to** | | |
| 1 | Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field. | |
| 2 | Learn the mathematical formulation of linear programming problem | |
| 3 | Learn the mathematical formulation of transportation problem. | |
| 4 | Understand the concepts of Complex variables and transformation for solving Engineering Problems. | |
| 5 | Learn the solutions of partial differential equations numerically | |

| UNIT-I | |
|---|---|
| **Probability Theory:** Random variables (discrete and continuous), probability density function, cumulative density function.<br>**Probability Distributions:** Binomial distribution, Poisson distribution. Normal distribution, Exponential distribution.<br>Joint probability distributions.<br>**Self-study:** Discrete and continuous probability problems<br>**Applications:** Discrete and continuous probability distributions help in analysing the probability models arising in engineering field.<br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8 Hrs** |
| **UNIT-II** | |
| **Optimization:** Linear Programming, mathematical formulation of linear programming problem (LPP), Types of solutions, Graphical Method, simplex method, big-M method, Dual – simplex method.<br>**Self-study:** Two phase simplex method<br>**Applications:** Applications of transportation Problems<br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8 Hrs** |
| **UNIT-III** | |
| The transportation problem: Initial Basic Feasible Solution (IBFS) by Least Cost Method, North West Corner Rule method, Vogel's Approximation Method, MODI method (Optimal Solution), Salesman problem, Assignment problem.<br>**Self-Study Topic**: Matrix Minima Method<br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8 Hrs** |

| UNIT-IV | |
|---|---|
| **Complex Variables:** Functions of complex variables, Analytic function, Cauchy-Riemann equations in Cartesian and polar coordinates, Construction of analytic function (Using Milne-Thomson method)<br><br>Consequences of Cauchy-Riemann equations, Properties of analytic functions. Application to flow problems- complex potential, velocity potential, equipotential lines, stream functions, stream lines.<br>**Self-study:** Unique Expression Method<br>**Applications:** Application to flow problems<br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8 Hrs** |
| **UNIT-V** | |
| **Numerical solutions of PDE** – Classification of second order equations, finite difference approximation to derivatives, solution of heat equations, solution of wave equations and solution of Laplace equation.<br>**Self-study:** Crank Nicolson method – problems.<br>**Applications:** To **s**olve boundary value problems<br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8 Hrs** |

| **Course Outcomes: After completing the course, the students will be able to** | |
|---|---|
| CO1 | Apply discrete and continuous probability distributions in analysing the probability models arising in engineering field. |
| CO2 | Learn the mathematical formulation of linear programming problem |
| CO3 | Solve the applications of transport problems |
| CO4 | Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory |
| CO5 | Learn the numerical solutions of partial differential equations |

| **Reference Books** | |
|---|---|
| **1.** | B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 44th Edition, 2013. |
| **2.** | Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India publishers, 10thedition, 2014. |
| **3.** | Prof G.B.Gururajachar "Engineering Mathematics-III , Academic Excellent series Publications, 2016-17 |
| **4.** | Bali N. P. & Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, 8th Edition |

**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

**Semester End Examination (SEE):**

**Total marks: 50+50=100**

**SEE** for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

| CO-PO Mapping | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO/PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | **3** | **3** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **1** |
| **CO2** | **3** | **3** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** |
| **CO3** | **3** | **2** | **0** | **2** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **CO4** | **3** | **3** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** |
| **CO5** | **3** | **3** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** |

| Semester: IV | | |
|---|---|---|
| **COMPUTER COMMUNICATION NETWORK (Theory)** | | |
| **Course Code: MVJ21IO42** | | **CIE Marks: 50** |
| **Credits: L:T:P: 3:0:0** | | **SEE Marks: 50** |
| **Hours: 40L** | | **SEE Duration: 3 Hrs.** |

| **Course Learning Objectives: The students will be able to** | |
|---|---|
| 1 | Understand the layering architecture of OSI reference model and TCP/IP protocol suite. |
| 2 | Know about the protocols associated with each layer. |
| 3 | Learn the different networking architectures and their representations. |
| 4 | Acquire a knowledge of various routing techniques and the transport layer services. |
| 5 | Learn the security features and functionality of application layer protocols. |

| **UNIT-I** | |
|---|---|
| *Prerequisites: Basic knowledge on computers & programming*<br>Introduction: Data Communications: Components, Representations, Data Flow, Networks: Network criteria, Physical Structures, Network Types: LAN, WAN, Switching, Internet.<br>Network Models: Protocol Layering: Scenarios, Principles, Logical Connections, TCP/IP Protocol Suite: Layered Architecture, Layers in TCP/IP suite, Description of layers, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing, The OSI Model: OSI Versus TCP/IP.<br>Laboratory Sessions/ Experimental learning:<br>1. Study and draw the layout of LAN connection in Computer Networks Lab in NetSim. List out the type of cabling involved.<br>Applications: Ethernet, Fibernet, Satellite Communication.<br>Video link / Additional online information:<br>1. http://www.redbooks.ibm.com/abstracts/gg243376.html<br>2. https://nptel.ac.in/courses/106/106/106106091/<br>https://nptel.ac.in/courses/106/105/106105080/ | **8 Hrs** |

| UNIT-II | |
|---|---|
| **Data-Link Layer:** Introduction: Nodes and Links, Services, Categories of link, Sublayers, Link Layer addressing: Types of addresses, ARP. Data Link Control (DLC) services: Framing, Flow and Error Control, Data Link Layer Protocols: Simple Protocol, Stop and Wait protocol, Piggybacking.<br>**Media Access Control:** Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA.<br>**Wired LANs: Ethernet:** Ethernet Protocol: IEEE802, Ethernet Evolution, Standard Ethernet: Characteristics, Addressing, Access Method, Efficiency, and Implementation.<br>**Wireless LANs:** Introduction: Architectural Comparison, Characteristics, Access control<br>**Laboratory Sessions/ Experimental learning:**<br>1. Study and analyze packet transfer using CSMA/CD and CSMA/CA using NetSim.<br>**Applications:** Collision detection and avoidance in wired and wireless network.<br>**Video link / Additional online information:**<br>https://nptel.ac.in/courses/106/105/106105183/ | **8 Hrs** |
| **UNIT-III** | |
| **Wireless LANs:** Introduction: Architectural Comparison, Characteristics, IEEE 802.11: Architecture, MAC Sublayer, Addressing Mechanism, Physical Layer, Bluetooth: Architecture, Layers.<br>**Connecting Devices:** Hubs, Switches.<br>**Virtual LANs:** Membership, Configuration, Communication between Switches and Routers, Advantages.<br>**Network Layer:** Introduction, Network Layer services: Packetizing, Routing and Forwarding, Other services, Packet Switching: Datagram Approach, Virtual Circuit Approach, IPV4 Addresses, Address Space, Classful Addressing, Classless Addressing, DHCP. | **8 Hrs** |

| | |
|---|---|
| **Laboratory Sessions/ Experimental learning:**<br>1. Study of different types of connecting devices.<br>**Applications:** Bluetooth, WiFi, WiMax<br>**Video link / Additional online information:**<br>https://nptel.ac.in/courses/117/102/117102062/ | |
| **UNIT-IV** | |
| **Transport Layer: Introduction:** Transport Layer Services, Connectionless and Connection oriented Protocols, Transport Layer Protocols: Simple protocol, Stop and wait protocol, Go-Back-N Protocol, Selective repeat protocol.<br>**Transport-Layer Protocols on the Internet:** User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, Segment, Connection, State Transition diagram, Windows in TCP, Flow control, Error control, TCP congestion control.<br>**Laboratory Sessions/ Experimental learning:**<br>1. Study of IP addressing, subnet mask and subnetting.<br>**Applications:** Routing and forwarding packets.<br>**Video link / Additional online information:**<br>https://nptel.ac.in/content/storage2/courses/106105080/pdf/M6L2.pdf | **8 Hrs** |
| **UNIT-V** | |
| **Application Layer:** Introduction: providing services, Application- layer paradigms, Standard Client -Server Protocols: World wide web, Hyper Text Transfer Protocol, FTP: Two connections, Control Connection, Data Connection, Electronic Mail: Architecture, Wed Based Mail, Telnet: Local versus remote logging. Domain Name system: Name space, DNS in internet, Resolution, DNS Messages, Registrars, DDNS, security of DNS.<br>**Laboratory Sessions/ Experimental learning:**<br>1. Transport analysis using TCP/UDP using NetSim.<br>**Applications:** MS Teams, Zoom, Cisco webex<br>**Video link / Additional online information:** | **8 Hrs** |

| | |
|---|---|
| 1. http://www.digimat.in/nptel/courses/video/106105183/L11.html<br>http://www.digimat.in/nptel/courses/video/106105183/L06.html | |

| **Course Outcomes: After completing the course, the students will be able to** | |
|---|---|
| CO1 | Analyze the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite. |
| CO2 | Apply the protocols and services of Physical and Data link layer. |
| CO3 | Describe functions associated with network layer and connecting devices. |
| CO4 | Analyze and apply the protocols and services of Transport layer. |
| CO5 | Analyze and apply the protocols and services of application layer. |

| **Reference Books** | |
|---|---|
| **1.** | Behrouz A Forouzan," Data Communication and Networks", 3rd Ed. TMH. |
| **2.** | Andrew S Tanebaum, "Computer Networks", 4th Ed. PHI/ Pearson education. |
| **3.** | S. Keshav, "An Engineering approach to Computer Networks", 5th Ed. Pearson. |
| **4.** | W.A. Shay, "Understanding communication and Networks", Thomson. |

**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

**Semester End Examination (SEE):**

**Total marks: 50+50=100**

**SEE** for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

| CO-PO Mapping | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | - | 1 |
| CO2 | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | - | 1 |
| CO3 | 3 | 3 | 3 | 3 | 2 | 1 | - | 2 | 1 | - | - | 1 |
| CO4 | 3 | 3 | 3 | 3 | 2 | 1 | - | - | 1 | - | - | 1 |
| CO5 | 3 | 3 | 3 | 2 | 2 | 1 | - | 2 | 1 | - | - | 1 |

| Semester: IV | | |
|---|---|---|
| **MACHINE LEARNING (Theory)** | | |
| **Course Code: MVJ21IO43** | | **CIE Marks: 50** |
| **Credits: L:T:P: 3:0:0** | | **SEE Marks: 50** |
| **Hours: 40L** | | **SEE Duration: 3 Hrs.** |

| **Course Learning Objectives: The students will be able to** | |
|---|---|
| 1 | Define machine learning and understand the basic theory underlying machine learning. |
| 2 | Differentiate supervised, unsupervised and reinforcement learning. |
| 3 | Understand the basic concepts of learning and decision trees. |
| 4 | Understand neural networks and Bayesian techniques for problems appear in machine learning |
| 5 | Gain the knowledge on instant based learning and reinforced learning. |

| **UNIT-I** | |
|---|---|
| *Prerequisites: Basics of binary tree, Decision Tree*<br>Introduction, Concept learning and Decision trees: Machine Learning Design, Applications of Machine learning, Learning Problems, Well posed learning problems, Designing a Learning system, Concept Learning, Perspective and Issues in Machine Learning.<br>Laboratory Sessions/ Experimental learning:<br>1. Implement and demonstrate the FIND-S Algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.<br>Applications: Data training samples, Speech Recognition algorithm.<br>Video link / Additional online information :<br>1. https://nptel.ac.in/courses/106/106/106106139/<br>https://www.digimat.in/nptel/courses/video/106105152/L01.html | **8 Hrs** |
| **UNIT-II** | |
| *Prerequisites: Data structures, Decision Tree and binary tree*<br>Decision Tree Learning and Artificial Neural Networks: Decision Tree Representation, Hypothesis Space Search, Inductive bias in decision tree, | **8 Hrs** |

| | |
|---|---|
| issues in Decision tree. Neural Network Representation, Perceptrons, Multilayer Networks and Back Propagation Algorithms.<br>**Laboratory Sessions/ Experimental learning:**<br>1. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.<br>**Applications:** Email Spam and Malware Filtering,ID3 algorithm, Self-driving cars<br>**Video link / Additional online information:**<br>1. https://nptel.ac.in/courses/106/106/106106198/<br>https://www.youtube.com/watch?v=fPLxFXiS9fU | |
| **UNIT-III** | |
| **Bayesian and Computational Learning:** Introduction, Analyze Bayes theorem, Bayes theorem demonstration and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm<br>**Laboratory Sessions/ Experimental learning:**<br>1. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.<br>**Applications:** Artificial Neural Network, Virtual Personal Assistant, Online Fraud Detection.<br>**Video link / Additional online information:**<br>https://nptel.ac.in/courses/106/105/106105215/ | **8 Hrs** |
| **UNIT-IV** | |
| **Instant Based Learning and Learning set of rules:** Demonstrate K-Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning and Develop Sequential Covering Algorithms.<br>**Reinforcement Learning:** Introduction, Evaluate Learning Task, Q Learning | **8 Hrs** |

| | |
|---|---|
| Laboratory Sessions/ Experimental learning:<br>Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same dataset for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.<br>**Applications**: Market segmentation, Document clustering<br>Video link / Additional online information :<br>1. http://1.https//nptel.ac.in/courses/11706087/<br>https://nptel.ac.in/courses/106/106/106106198/ | |
| **UNIT-V** | |
| **Analytical Learning**: Perfect Domain Theories, Explanation Based Learning, Inductive, Analytical Approaches, FOCL Algorithm.<br>**Real life applications of Machine learning**: Develop an algorithm and flowchart for Traffic prediction, Image recognition and Self-driving cars.<br>Laboratory Sessions/ Experimental learning:<br>1. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.<br>**Applications**: Regression algorithm, Tower of Hanoi.<br>Video link / Additional online information:<br>https://nptel.ac.in/courses/117102059/ | **8 Hrs** |

| **Course Outcomes: After completing the course, the students will be able to** | |
|---|---|
| CO1 | Choose the learning techniques and investigate concept learning. |
| CO2 | Identify the characteristics of decision tree and solve problems associated with |
| CO3 | Apply effectively neural networks for appropriate applications. |
| CO4 | Apply Bayesian techniques and derive effectively learning rules |
| CO5 | Evaluate hypothesis and investigate instant based learning and reinforced learning. |

| **Reference Books** | |
|---|---|
| **1.** | Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (INDIAN EDITION), 2013. |
| **2.** | Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013. |

| | |
|---|---|
| **3.** | T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer; 1st edition, 2001. |


**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

**Semester End Examination (SEE):**

**Total marks: 50+50=100**

**SEE** for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

**CO-PO Mapping**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 2 | - | - | - | 2 | - | - | 1 |
| CO2 | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 | - | - | 1 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 1 | - | - | 2 | - | - | 1 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | - | 2 | - | - | 1 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | - | 2 | - | - | 1 |

| Semester: IV | | |
|---|---|---|
| **SENSOR AND VIRTUAL INSTRUMENTATION (Theory and Practice)** | | |
| **Course Code: MVJ21IO44** | | **CIE Marks:50+50** |
| **Credits: L:T:P: 3:0:1** | | **SEE Marks: 50 +50** |
| **Hours:40 L+ 26 P** | | **SEE Duration: 03+03 Hours** |

| **Course Learning Objectives: The students will be able to** | |
|---|---|
| 1 | To identify the characteristics of transducer and its response for various inputs. |
| 2 | To explain the concepts of Virtual Instrumentation and LabVIEW. |
| 3 | To acquaint about the concepts of programming in Virtual Instrumentation using LabVIEW. |
| 4 | To brief about the data acquisition and state machine architecture in LabVIEW. |
| 5 | To impart knowledge on various instrument control interface and Machine Vision. |

| **UNIT-I** | |
|---|---|
| *Prerequisites: knowledge of basic of sensors*<br>Static characteristics – Accuracy, precision, resolution, sensitivity, linearity – Dynamic characteristics – Mathematical model of transducer – Zero, first and second order transducers<br>Resistance thermometer – Thermistor – Hot-wire anemometer – Humidity sensor - Piezoelectric transducer – Hall effect transducer – Magnetostrictive - Vibration sensor – Ultrasonic based sensors – Introduction to MEMS and Nanotechnology – Applications<br>Laboratory Sessions/ Experimental learning:<br>Characteristic of LDR and thermistor.<br>Characteristics of Hall effect transducer.<br>Applications: Selection of appropriate sensors for different industrial applications.<br>Video link / Additional online information:<br>1. https://www.youtube.com/watch?v=YKM2Dw8QS9w<br>2. https://www.youtube.com/watch?v=SN5SSwlzNzU | **10 Hrs** |
| **UNIT-II** | |

| | |
|---|---|
| **Introduction**: Tradition instrument – Virtual instrument – Components of a VI – Difference between TI and VI – Advantages of VI – VI Programming Environment: Front panel – Block diagram – VI and sub-VI.<br>**Laboratory Sessions/ Experimental learning**: Virtual instrumentation<br>**Applications**: Develop a simulation platform for various circuits.<br>**Video link / Additional online information:**<br>https://www.youtube.com/watch?v=EmmpdzBzY74 | **10 Hrs** |
| **UNIT-III** | |
| Case structure – Sequence structures - Loops – For loop – While loop – Shift registers – Formula nodes – Local and global variables – Control timings – Waveform chart – XY Graph – Waveform graph – Arrays and array operations – Clusters and cluster functions – String and file I/O<br>**Laboratory Sessions/ Experimental learning:**<br>Programming with structures, Arrays, Clusters.<br>**Applications**: Tank level automation, Home automation, Traffic Light control<br>**Video link / Additional online information:**<br>1. https://www.youtube.com/watch?v=cJfIOhFg8Ew<br>2. https://www.youtube.com/watch?v=wbKCS--8IDo | **10 Hrs** |
| **UNIT-IV** | |
| State Machine architecture – Concepts of data acquisition and signals types– Signal conditioning and grounding – Hardware and software configuration – Analog and digital I/O – Timers and counters – DAQ assistant and DAQmx<br>**Laboratory Sessions/ Experimental learning:**<br>ATM Machine program, Car Wash Program<br>**Applications**: Coffee Vending Machine<br>**Video link / Additional online information:**<br>1. https://www.youtube.com/watch?v=V7Bmty7K2nw<br>2. https://www.youtube.com/watch?v=sWPgItbhWOU | **10 Hrs** |

| UNIT-V | |
|---|---|
| GPIB – Hardware and software – Instrument I/O assistant – VISA – Instrument drivers – Driver VI – Serial port communication – IMAQ Vision – Image processing and analysis – Particle analysis – Machine vision – Hardware and software – Building a complete machine vision system – Acquiring and displaying images with NO – IMAQ driver software – Image processing tools and functions in IMAQ Vision<br>Laboratory Sessions/ Experimental learning:<br>Image processing functions and operations using LabVIEW.<br>Applications: Real time data acquisition using NI Hardware<br>Video link / Additional online information:<br>1. https://www.youtube.com/watch?v=U0bQBOEiBQY<br>2. https://www.youtube.com/watch?v=6DBihtsVCcY | **10 Hrs** |

**LABORATORY EXPERIMENTS**

1. Programming using different data types: numeric, Boolean and strings.
    a. Develop a VI to check whether a given input string is a palindrome or not.
    b. Build a VI to create a two digit seven segment display LED display.
3. Programming using for loop and while loop.
    a. Build a VI to find the Fibonacci series according to the given input of the user.
    b. Create a VI to find the sum of first n natural numbers using a while loop with a feedback node and Shift Register.
4. Programming with shift register and formula node.
    a. Create a VI to find the factorial of a given number using While loop and Shift Register.
    b. Build a VI to find the roots of a quadratic equation. Input the coefficients of X2, X and Constant as A,B and C respectively. Display the roots and the message if the roots are Real or imaginary or equal.
5. Programming with case structure, flat sequence structure
    a. Build a VI to find whether the given input year is a leap year or not.
    b. Build a VI to simulate traffic light control using Flat Sequence Structure and Local Variables.
6. Programming on Arrays
    a. Build a VI that generates a 1D array of any integer values and replace the negative numbers with 0. Then build from the same VI to remove the negative numbers and sort the arrays. (Example: Input array : 1,-3, 4, 9, 21, -89; Output array1: 1, 0, 4, 9, 21, 0 , Output array 2: 1, 4, 9, 21(Sorted))
    b. Build a VI to generate 1D Boolean array Running LED.
7. Programming on Clusters
   This task focus on updating the student database with grace mark.
   Database:

Take a cluster constant. Put string control for Name. Numeric control for Roll no. Numeric control for Marks. Boolean LED for Pass/Fail. Right click on the cluster to auto size it. Put it in an array constant and create the database.

Task:

The task is to update the student database with grace marks.

1. The grace marks can be + value or - value and the functionality should be the same.
2. It should add or subtract the grace marks according to the input.
3. Marks should be updated accordingly
4. The pass/fail status should be updated according to the marks
5. Make sure that grace marks should not cross 100 or should not be less than 0.

8. Programming with sub VI
    a. Create a VI to find the nCr and nPr values using subVI.
    b. Create a VI to compute full adder logic using half adder logic as subVI.
9. Roll of a Dice. Write a VI to count the number of occurrence's in the multiple roll of the dice.
10. Write a VI to find the berth spot (Side lower/middle/ upper, etc) of the given seat number. (Ex: 1-LB , 2-MB, 3-UB, 4-LB,5-MB, 6-UB, 7-SL, 8-SU)
11. Develop a VI to find whether a given number is a disarium number. (A disarium number is a number in which the sum of the digits to the power of their respective position is equal to the number itself (position is counted from left to right starting from 1). Hence,175 is a disarium number.)
    Example: 175=(1^1)+(7^2)+(5^3) = 175 = Disarium Number
12. Build a VI for SGPA calculation.

**Any 12 experiments to be conducted**

| **Course Outcomes: After completing the course, the students will be able to** | |
|---|---|
| CO1 | Choose appropriate sensors for the measurement of various physical parameters. |
| CO2 | Describe the concepts of Virtual Instrumentation and LabVIEW |
| CO3 | Program in LabVIEW with various tools. |
| CO4 | Deal with various data acquisition methods in LabVIEW. |
| CO5 | Interface the system with external device using communication methods and instrument drivers and able to work on IMAQ applications. |

| **Reference Books** | |
|---|---|
| **1.** | "A Course in Electrical and Electronics Measurements and Instrumentation", Sawhney A K,Dhanpat Rai and Sons, New Delhi, 2013 |
| **2.** | Virtual Instrumentation Using LabVIEW", Jovitha Jerome, Prentice Hall of India, Fifth Edition, 2018. |
| **3.** | "Data Acquisition using LabVIEW", Behzad Ehsani, PACKT Publishing Ltd, 2016. |

**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

**Laboratory- 50 Marks**

The laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of the marks over number of weeks is considered for 30 marks. At the end of the semester a test is conducted for 10 marks. The students are encouraged to implement additional innovative experiments in the lab and are awarded 10 marks. Total marks for the laboratory is 50.

**Semester End Examination (SEE):**

**Total marks: 50+50=100**

**SEE** for 50 marks are executed by means of an examination.

The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 1 | - | - | 1 |
| CO2 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 1 | - | - | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 1 | - | - | 1 |
| CO4 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 1 | - | - | 1 |
| CO5 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 1 | - | - | 1 |

| Semester: IV | | |
|---|---|---|
| **DATA STRUCTURES AND APPLICATIONS (Theory and Practice)** | | |
| **Course Code: MVJ21IO45** | | **CIE Marks:50+50** |
| **Credits: L:T:P: 3:0:1** | | **SEE Marks: 50 +50** |
| **Hours:40 L+ 26 P** | | **SEE Duration: 03+03 Hours** |

| **Course Learning Objectives: The students will be able to** | |
|---|---|
| 1 | Identify the importance of data structures & memory allocation. |
| 2 | Perform operations on stacks and queues and its applications. |
| 3 | Apply the operations of linked list, Trees & Graphs in various applications. |
| 4 | Apply searching and sorting operations in real time applications. |
| 5 | |

| **UNIT-I** | |
|---|---|
| Introduction: Data Structures, Classifications (Primitive & Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Dynamically allocated arrays.<br>Abstract Data Type, Array Operations: Traversing, inserting, deleting, searching, and sorting,<br>Array ADT :Multidimensional Arrays, Polynomials and Sparse Matrices.<br>Strings: Basic Terminology, Storing, Operations and Pattern Matching algorithms. Programming Examples.<br>Laboratory Sessions/ Experimental learning:<br>1. Create an array of structure which has the following members Student name, Student USN, Marks1, Marks2, Marks3. Allocate memory to store 5 students details initially. When a new student details need to be entered or to be deleted in this array, dynamically change the array size. Write a program to implement this scenario and display the result.<br>2. Find the bug for the following code and then Debug it<br>int minval(int *A, int n) {<br>int currmin; | **10 Hrs** |

```
    for (int i=0; i<n; i++)
      if (A[i] < currmin)
        currmin = A[i];
     return currmin;
   }
```

3. Compile the following code and debug it.

```
#include <stdio.h>
#include <string.h>
struct student
{
  int id;
  char name[30];
  float percentage;
};
int main()
{
  int i;
  struct student record1 = {1, "Raju", 90.5};
  struct student *ptr;
     printf("Records of STUDENT1: \n");
     printf("  Id is: %d \n", ptr->id);
     printf("  Name is: %s \n", ptr->name);
     printf("  Percentage is: %f \n\n", ptr->percentage);
   return 0;
```

| | |
|---|---|
| }<br><br>Real Time Applications: System memory allocation<br><br>Video link / Additional online information (related to module if any):<br><br>1. https://nptel.ac.in/courses/106106130/<br>2. https://nptel.ac.in/courses/106105085/<br>3. https://nptel.ac.in/courses/106/106/106106127/<br>4. https://www.coursera.org/lecture/data-structures/arrays-OsBSF | |
| **UNIT-II** | |
| Stacks: Definition, Stack Operations, Stack ADT, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression.<br>Recursion - GCD, Tower of Hanoi.<br>Queues: Definition, Array Representation, Queue Operations, Queue ADT, Circular Queues, Circular queues using Dynamic arrays, Dequeues, Priority Queues. Programming Examples.<br>Laboratory Sessions/ Experimental learning:<br><br>Design, Develop and Implement a menu driven Program in C for the following operations on DEQUEUE of Integers (Array Implementation of Queue with maximum size MAX)<br><br>a. Insert an Element on to DEQUEUE<br>b. Delete an Element from DEQUEUE<br>c. Demonstrate Overflow and Underflow situations on DEQUEUE<br>d. Display the status of DEQUEUE<br>e. Exit Support the program with appropriate functions for each of the above operations<br>Real Time Applications: Game applications, Ticket booking applications (Eg: Train, restaurant etc) | **10 Hrs** |

| | |
|---|---|
| Video link / Additional online information (related to module if any):<br><br>1.https://nptel.ac.in/courses/106106130/<br><br>2. https://nptel.ac.in/courses/106102064/<br><br>3. https://nptel.ac.in/courses/106105085/<br><br>4. https://nptel.ac.in/courses/106/106/106106127/ | |
| **UNIT-III** | |
| Linked Lists: Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists – Polynomials. Programming Examples<br>Hashing: Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.<br>Laboratory Sessions/ Experimental learning:<br>1.Design, Develop and Implement a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes a. Represent and Evaluate a Polynomial P(x,y,z) = 6x2 y 2 z-4yz5 +3x3 yz+2xy5 z-2xyz3 b. Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z) Support the program with appropriate functions for each of the above operations<br>2. Debug the following code and explain the process<br><br>//Insert a value into an ordered linked list<br>void insert(lnode*& curr, int val) {<br>if (curr == NULL)<br>curr = new lnode(val, NULL);<br>else if (lnode->val > val) | **10 Hrs** |

```
        curr = new lnode(val, curr->next);
      else {
        curr = curr->next;
        insert(curr, val);
      }
    }
```

Real Time Applications: Music Player, Image Viewer, Web browser, Process Management, Mechanical field

**Video link / Additional online information (related to module if any):**

https://nptel.ac.in/courses/106106130/

https://nptel.ac.in/courses/106102064/

https://nptel.ac.in/courses/106105085/

**UNIT-IV**

**Trees:** Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations. Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression, AVL Trees, Splay Trees, B-Tree, Programming Examples

**10 Hrs**

**Laboratory Sessions/ Experimental learning:**

Design, Develop and Implement a menu driven Program in C for the following operations on AVL Trees

i) Construct an AVL tree by inserting the following elements in the given order.

63, 9, 19, 27, 18, 108, 99, 81.

ii)searching for a node

| | |
|---|---|
| iii)Deleting a node<br>**Real Time Applications:** Indexing in databases, Programming Languages, Computer chess games, Computer file system, Undo function in text editor, representing city region telehone network etc.<br>**Video link:**<br>• https://nptel.ac.in/courses/106102064/<br>• http://www.digimat.in/nptel/courses/video/106106127/L50.html<br>https://www.youtube.com/watch?v=ffgg_zmbaxw | |
| **UNIT-V** | |
| **Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search, Topological Sort.<br>**Sorting and Searching:** Quick sort, Insertion Sort, Radix sort, Merge Sort, Address Calculation Sort.<br>**Laboratory Sessions/ Experimental learning:**<br>Sort a given set of elements using the sorting Method which divides input array in two halves, calls itself for the two halves and then merges the two sorted halves" and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.<br>**Real Time Applications:** Graph Theory, E-Commerce websites, Google Maps, Facebook<br>**Video link:**<br>• https://www.youtube.com/watch?v=hk5rQs7TQ7E&feature=youtu.be<br>https://nptel.ac.in/courses/106/102/106102064/ | **10 Hrs** |
| **LABORATORY EXPERIMENTS** | |
| 1. A courier company has number of items to be delivered to its intended customers through its salesman. The salesman visits the following cities to deliver the respective items. Write a C program, | |

| S.No | Cities | Number of items |
|---|---|---|
| 1 | Agra | 25 |
| 2 | Chennai | 50 |
| 3 | Kolkata | 59 |
| 4 | Mumbai | 72 |
| 5 | Delhi | 12 |

a. To display name of cities where salesman has delivered maximum and minimum number of items

b. To search the number of items to be delivered of a user supplied city.

**2.** Implement Knuth-Morris- Pratt pattern matching algorithm using C program.

**3.** Design, Develop and Implement a menu driven Program in C with the listed operations for the data structure which follows Last In First Out (LIFO) order. (Use Array Implementation of specified DS with maximum size MAX).

a. Push an Element

b. Pop an Element

c. Demonstrate how it can be used to check Palindrome

d. Demonstrate Overflow and Underflow situations

e. Display the status

f. Exit

Support the program with appropriate functions for each of the above operations

**4.** Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.

**5.** Design, Develop and Implement a menu driven Program in C for the following operations on Ring Buffer of Integers (Use Array Implementation)

a. Insert an Element on to Ring Buffer

b. Delete an Element from Ring Buffer

c. Demonstrate Overflow and Underflow situations on Ring Buffer

d. Display the status of Ring Buffer

e. Exit

Support the program with appropriate functions for each of the above operations

**6.** Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Programme, Sem, PhNo

a. Create a SLL of N Students Data by using front insertion

b. Display the status of SLL and count the number of nodes in it

c. Perform Insertion / Deletion at End of SLL

d. Perform Insertion / Deletion at Front of SLL

e. Exit

7. Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo.

a. Create a DLL of N Employees Data by using end insertion.

b. Display the status of DLL and count the number of nodes in it.

c. Perform Insertion and Deletion at End of DLL .

d. Perform Insertion and Deletion at Front of DLL .

e. Demonstrate how this DLL can be used as Double Ended Queue.

f. Exit

8. Design, Develop and Implement a menu driven C Program for the following operations on Binary Search Tree (BST) of Integers.

a) Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2.

b) Traverse the BST recursively in inorder, preorder & postorder

c) Search the BST for a given element (KEY) and report the appropriate message

9. Design, Develop and Implement a Program in C for the following operations on Graph(G) of Cities

a. Create a Graph of N cities using Adjacency Matrix.

b. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method

**10.** Develop a C program to sort a given set of n integer elements using Quick Sort method. Run the program for varied values of n and show the results of each iteration.

**11.** Given a File of N employee records with a set K of Keys(4-digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash

| |
|---|
| Table(HT) of m memory locations with L as the set of memory addresses (2- digit) of locations in HT. Let the keys in K and addresses in L are Integers. Design and develop a Program in C that uses Hash function H: K→L as H(K)=K mod m (remainder method), and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing. |

| **Course Outcomes: After completing the course, the students will be able to** | |
|---|---|
| CO1 | Identify the necessity of data structure and its storage process. |
| CO2 | Analyse the various operations performed on stack and queues for different applications. |
| CO3 | Perform various operations on linked list for different applications. |
| CO4 | Learn Trees and its applications. |
| CO5 | Analyse the concepts of Graphs, searching, sorting & hashing in real time. |

| **Reference Books** | |
|---|---|
| **1.** | Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014. |
| **2.** | Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014. |
| **3.** | Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012. |
| **4.** | Mark Allen Weiss, –Data Structures and Algorithm Analysis in C‖, 2nd Edition, Pearson Education,1997. |

**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

**Laboratory- 50 Marks**

The laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of the marks over number of weeks is considered for 30 marks. At the end of the semester a test is conducted for 10 marks. The students are encouraged to implement additional innovative experiments in the lab and are awarded 10 marks. Total marks for the laboratory is 50.

**Semester End Examination (SEE):**

**Total marks: 50+50=100**

**SEE** for 50 marks are executed by means of an examination.

The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 1 | - | - | - | - | - | - | 2 |
| CO2 | 3 | 3 | 3 | - | - | - | - | - | 1 | - | 1 | 2 |
| CO3 | 2 | 2 | 2 | 1 | 3 | - | - | - | - | - | 1 | 3 |
| CO4 | 3 | 2 | 3 | - | - | - | - | - | - | 2 | 3 | 2 |
| CO5 | 3 | 2 | 3 | - | - | - | - | - | - | 2 | 3 | 2 |

| | | | |
|---|---|---|---|
| Course Title | SAMSKRUTHIKA KANNADA | Semester | III/IV |
| Course Code | MVJ21IO46 | CIE | 50 |
| Total No. of Contact Hours | 15 | SEE | 50 |
| No. of Contact Hours/week | 1 (L:T:P:: 1 :0 : 0) | Total | 100 |
| Credits | 1 | Exam. Duration | 1 Hour |

**Course objective :**This course will enable students to understand Kannada and communicate in Kannada language

- Samskruthika Kannada –Parichaya (Introduction to Adalithakannada )
- Kannada Kavyagalaparichaya (Kannada D Ra Bendre, Siddalingaiha)
- Adalithdalli Kannada Padagalu (Kannada KagunithaBalake, Patra Lekhana, Prabhandha)
- Kannada Computer Gnyana (Kannada ShabdhaSangraha, Computer Paribashikapadagalu)
- Activities in Kannada.

| Module - 1 | L1 | 3 Hrs |
|---|---|---|
| 1. PÀ£ÀßqÀ ¨sÁµÉ-¸ÀAQë¥ÀÛ «ªÀgÀuÉ.<br>2. ¨sÁµÁ ¥ÀæAiÉÆÃUÀ¯ÁèUÀÄªÀ ¯ÉÆÃ¥ÀzÉÆÃµÀUÀ¼ÀÄ ªÀÄvÀÄÛ CªÀÅUÀ¼À ¤ªÁgÀuÉ | | |
| **Module - 2** | **L1** | **3 Hrs** |
| 1. ¯ÉÃR£À aºÉßUÀ¼ÀÄ ªÀÄvÀÄÛ CªÀÅUÀ¼À G¥ÀAiÉÆÃUÀ<br>2. ¥ÀvÀæ ªÀåªÀºÁgÀ. | | |
| **Module - 3** | **L1** | **3 Hrs** |
| 1. DqÀ½vÀ ¥ÀvÀæUÀ¼ÀÄ.<br>2. ¸ÀPÁðgÀzÀDzÉÃ±À ¥ÀvÀæUÀ¼ÀÄ | | |
| **Module - 4** | **L1** | **3 Hrs** |

| | | |
|---|---|---|
| 1. ÀAQÃ¥ÀÛ ¥Àæ§AzsÀgÀZÀ£É, ¥Àæ§AzsÀ ªÀÄvÀÄÛ ¨sÁµÁAvÀgÀ<br>2. PÀ£ÀßqÀ ±À§Ý¸ÀAUÀæºÀ | | |
| Module - 5 | L1 | 3 Hrs |
| 1. PÀA¥ÀÆålgï ºÁUÀÆ ªÀiÁ»wvÀAvÀæeÁÕ£À<br>2. ¥Áj¨sÁ¶PÀ DqÀ½vÀ PÀ£ÀßqÀ ¥ÀzÀUÀ¼ÀÄ ªÀÄvÀÄÛvÁAwæPÀ/PÀA¥ÀÆålgï ¥Áj¨sÁ¶PÀ ¥ÀzÀUÀ¼ÀÄ. | | |

| Scheme of Evaluation: | | |
|---|---|---|
| Details | | Marks |
| Average of three Internal Assessment (IA) Tests of 30 Marks each i.e.<br>Σ (Marks Obtained in each test) / 3 | CIE(50) | 30 |
| Assignment / Case Studies / Quiz | | 20 |
| Semester End Examination | SEE (50) | 50 |
| Total | | 100 |

| Textbooks: | |
|---|---|
| 1. | Adalitha Kannada – Dr. L Thimmesh, Prof. V Keshav Murthy |

| | | | |
|---|---|---|---|
| Course Title | BALAKE KANNADA | Semester | III/IV |
| Course Code | MVJ21IO46 | CIE | 50 |
| Total No. of Contact Hours | 15 | SEE | 50 |
| No. of Contact Hours/week | 1 (L : T : P :: 1 :0 : 0) | Total | 100 |
| Credits | 1 | Exam. Duration | 1 Hour |

Course objective :

This course will enable students to understand Kannada and communicate in Kannada language

- Vyavharika Kannada –Parichaya (Introduction to Vyavharikakannada )
- Kannada Aksharamaalehaaguuchcharane(Kannada Alphabets and Pronounciation.
- Sambhashanegaagi Kannada Padagalu (Kannada Vocubulary for Communication).
- Kannada Grammer in Conversations (Sambhasaneyalli Kannada Vyakarana)
- Activities in Kannada

| |
|---|
| Module - 1 |
| Vyavharika Kannada –Parichaya (Introduction to Vyavharikakannada ) |
| Module - 2 |
| Kannada Aksharamaalehaaguuchcharane(Kannada Alphabets and Pronounciation |
| Module - 3 |
| Sambhashanegaagi Kannada Padagalu (Kannada Vocubulary for Communication). |
| Module - 4 |
| Kannada Grammar in Conversations (Sambhasaneyalli Kannada Vyakarana) |
| Module - 5 |
| Activities in Kannada |

Scheme of Evaluation:

| Details | | Marks |
|---|---|---|
| Average of three Internal Assessment (IA) Tests of 30 Marks each i.e. Σ (Marks Obtained in each test) / 3 | CIE(50) | 30 |
| Assignment / Case Studies / Quiz | | 20 |

| | | |
|---|---|---|
| Semester End Examination | SEE (50) | 50 |
| Total | | 100 |

| | | | |
|---|---|---|---|
| Course Title | SUMMER INTERNSHIP-I | Semester | III |
| Course Code | MVJ21INT48 | CIE | 50 |
| Total No. of Contact Hours | Industrial Oriented | SEE | 50 |
| No. of Contact Hours/week | - | Total | 100 |
| Credits | 2 | Exam. Duration | - |

Course Objective:

- To get the field exposure and experience.
- To apply the theoretical concept in field application
- To prepare the comparison statement of difference activities

**Internship:** This shall be carried out by students in industry set-up related to the construction/ materials testing laboratories/research organizations/project management consulting firms/QS and QA organizations/ planning and design offices/Professional organizations and other avenues related to the Electronics and Communication engineering domain in consultation and approval of internship guide/HOD /internship committees of the institutions.

**Course outcomes:** At the end of the course the student will be able to:

| | |
|---|---|
| CO1 | Develop skills to work in a team to achieve common goal. Develop skills of project management and finance. |
| CO2 | Develop skills of self-learning, evaluate their learning and take appropriate actions to improve it. |
| CO3 | Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs. |

Scheme of Evaluation:

**Internal Marks:** The Internal marks (50 marks) evaluation shall be based on midterm and final presentation of the activities undertaken during the internship, to a panel comprising internship guide, a senior faculty from the department and head of the

department. Each student should submit the internship report at the end of semester with internship certificate.

**Semester End Examination:** Viva-Voce examination shall be conducted by a panel of examiners consisting of internship supervisor, a senior faculty from the department and head of the department.

**CO-PO Mapping**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 2 |
| CO2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 |
| CO3 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 |

High-3, Medium-2, Low-1

| Semester: IV | | |
|---|---|---|
| **Additional Mathematics-II (Common to all branches )** | | |
| **Course Code:** | **MVJ21MATDIP2** | **CIE Marks:50** |
| **Credits:** | **L:T:P:S: 4:0:0:0** | **SEE Marks: 50** |
| **Hours:** | **40L** | **SEE Duration: 3 Hrs** |
| **Course Learning Objectives: The students will be able to** | | |
| 1 | To familiarize the important concepts of linear algebra. | |
| 2 | Aims to provide essential concepts differential calculus, beta and gamma functions. | |
| 3 | Introductory concepts of three-dimensional geometry along with methods to solve them. | |
| 4 | Linear differential equations | |
| 5 | Formation of partial differential equations. | |

| UNIT-I | |
|---|---|
| **Linear Algebra:** Introduction - Rank of matrix by elementary row operations - Echelon form. Consistency of system of linear equations - Gauss elimination method. Eigen values and eigen vectors of a square matrix. Diagonalization of a square matrix of order two.<br><br>**Self study**: Application of Cayley-Hamilton theorem (without proof) to compute the inverse of a matrix-Examples.<br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8 Hrs** |
| **UNIT-II** | |
| **Differential calculus:** Indeterminate forms: L-Hospital rule (without proof), Total derivatives, and Composite functions. Maxima and minima for a function of two variables.<br>**Beta and Gamma functions:** Beta and Gamma functions, Relation between Beta and Gamma function-simple problems.<br>**Self study**: Curve tracing.<br><br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8Hrs** |
| **UNIT-III** | |
| **Analytical solid geometry :** Introduction –Directional cosine and Directional ratio of a line, Equation of line in space- differentforms, Angle between two line, shortest distance between two line, plane and equation of plane in different forms and problems.<br>**Self study**: Volume tetrahedron.<br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8Hrs** |
| **UNIT-IV** | |
| **Differential Equations of higher order:** Linear differential equations of second and higher order equations with constant coefficients. Inverse Differential operator, Operators methods for finding particular integrals , and Euler –Cauchy equation.<br><br>**Self study**: Method of variation of parameters<br>**Video Link**: | **8 Hrs** |

| | |
|---|---|
| 1. http://nptel.ac.in/courses.php?disciplineID=111 | |
| **UNIT-V** | |
| **Partial differential equation:** Introduction- Classification of partial differential equations, formation of partial differential equations. Method of elimination of arbitrary constants and functions. Solutions of non-homogeneous partial differential equations by direct integration. Solution of Lagrange's linear PDE.<br>**Self study:** One dimensional heat and wave equations and solutions by the method of separable of variable<br><br>**Video Link**:<br>1. http://nptel.ac.in/courses.php?disciplineID=111 | **8 Hrs** |

| **Course Outcomes: After completing the course, the students will be able to** | |
|---|---|
| CO1 | Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigen vectors required for matrix diagonalization process. |
| CO2 | Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians. |
| CO3 | Understand the Three-Dimensional geometry basic, Equation of line in space- different forms, Angle between two line and studying the shortest distance . |
| CO4 | Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations. |
| CO5 | Construct a variety of partial differential equations and solution by exact methods. |

| **Reference Books** | |
|---|---|
| **1.** | B.S. Grewal, Higher Engineering Mathematics**,** Khanna Publishers, 43rd Edition**,** 2013**,** . |
| **2.** | G. B. Gururajachar, Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19 |
| **3.** | Chandrashekar K. S, Engineering Mathematics-I, Sudha Publications, 2010. |

**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

**Semester End Examination (SEE):**

**Total marks: 50+50=100**

**SEE** for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

| **CO-PO Mapping** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO/PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **CO2** | 3 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **CO3** | 3 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| **CO4** | 2 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **CO5** | 2 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

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