MT-PT-31 MATLAB PROGRAMMING

L/T - 4 | **Total Credits – 4** | **Internal - 30 Marks**
External – 70 Marks

Note:- Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Course Learning Objectives:

1. Introduce the MATLAB software environment.
2. Fortify an organized, top-down way to define and solve big problems.
3. Introduce common approaches, structures, and conventions for creating and evaluating computer programs, primarily in a procedural paradigm with a introduction to object-oriented concepts and terminology.
4. Apply a variety of common numeric techniques to solve and visualize engineering-related computational problems.
5. To study various toolboxes to solve real life applications

Course Learning Outcomes:

1. Use MATLAB effectively to analyze and visualize data.
2. Apply numeric techniques and simulations to solve engineering-related problems.
3. Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to achieve computational objectives.
4. Have in depth understanding and use of Matlab fundamental data structures (classes).
5. Create and control simple plot and user-interface graphics objects in MATLAB.
6. Be able to understand and use Matlab Toolboxes for solving real life problems.

Unit - I

MATLAB FUNDAMENTALS: What is MATLAB? , History of MATLAB, Origin, Growth and Development, Features of MATLAB, Why to use MATLAB? , Menus and the toolbar, computing with MATLAB, types of file , Editor Debugger, Some useful MATLAB Commands, MATLAB Help System,creating directory and saving files, Constants Variables and Expressions-Character Set, Data Type in MATLAB, Constants, Variables and Expressions, Operators, Hierarchy of Operations, Built-in-Function, Assignment Statements. Vectors and Matrices- Scalars and Vectors, Entering data in MAtrices, Line continuation, Matrices Subscripts, Muti-dimensional matrices and Arrays, Matrix Manipulation, Special MAtrices, Commands related to matrices, Structure Arrays, Cell Arrays.

Unit - II

Polynomials -Entering, Evaluation, Roots,Operations

Input/Output Statements- Data Input, Interactive Inputs, Reading/SToring DAta files, Output COmmands, Low level Input Output FUnctions.

Introduction to Data Import and Export, Other MATLAB I/O capabilities, Supported File Format, Working with Audio/Video File, Importing Audio/Video Data, Reading Audio/video Data From a file, Exporting Audio/Video Data, Example, Working with Spreadsheets, Writing to an XLS File, Reading from an XLS Files, Working with Graphics File, Importing Graphics data, Exporting Graphics data, MATLAB-GUI with GUIDE, Creating a simple GUI Programmatically, Dissertations of different components in GUIDE, Creating Menus.

Unit - III

Matlab Graphics- 2D/3D Plotting Visualization Using MATLAB

2D plot , Multiple Plot, Style options, legends, subplots, Specialized 2D plot-logarithmic,polar,area, bar,barh,hist,rose, pie, stairs,stem,compass. 3D plot - plot3, bar3, bar3h, pie3, stem 3, meshgrid, mesh, surf, contour, contour3.

Control Structures- loops- for,nested for, while, Branch Control STructure- if, switch, break, continue, error, try-catch, Debugging MatLab Programs.

Unit - IV

Introduction to MATLAB Toolboxes

Simulink Introduction, Image & Video processing Toolbox: Application Level Image Processing Techniques, MRI Image processing, Fuzzy Logic Toolbox, Neural Network Toolbox.

Text/Reference Books:
1. Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar,MATLAB and its Application in Engineering, Pearson Education.
2. Ram N.Patel, Ankush Mittal, Programming in MATLAB, A Problrm Solving Approach, Pearson Education.
3. Jim Sizemore, John P.Mueller, MATLAB FOR DUMMIES", Wiley.
4. Stephen J.Chapman, Matlab Programming for Engineers, Thomson-Engineering Publisher, CENGAGE Learning.
5. Duane Hanselman, Bruce L Littlefield, Mastering MATLAB 7, Prentice Hall.
6. Amos Gilat, MATLAB: An Introduction with Application, Wiley Publisher.
7. Jaydeep Chakravorty, Introduction to MATLAB Programming , Toolbox and Simulink, Universities Press.
8. S.N. Sivanandam, S.N.Deepa, MATLAB with Control system, signal processing, Image processing toolboxes, Wiley.

MT-PT-32 RESEARCH METHODOLOGY

L/T - 4   **Total Credits – 4**   **Internal - 30 Marks**
                                                                External – 70 Marks

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Course Learning Objectives:
1. Identify and discuss the role and importance of research in the social sciences.
2. Identify and discuss the issues and concepts salient to the research process.
3. Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
4. Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting.

Course Learning Outcomes:
Students who successfully complete this course will be able to:
1. Explain key research concepts and issues
2. Read, comprehend, and explain research articles in their academic discipline.

UNIT I
Objectives and types of Research: Motivation and Objectives- Research Methods vs. Methodology, Types of Research- Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs, Empirical.
Research Formulation: Defining and formulating the research problem-. Selecting the problem, necessity of defining the problem, Importance of Literature Review in defining a problem, literature review- Primary and secondary source reviews, Hypothesis- Definition, Qualities of a good hypothesis, null hypothesis and alternatives.

UNIT II
Research design and methods: Basic principles, Need of research design- features of good design, Important concepts relating to research design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Sampling Methods, Measurement: Concept of measurement, Problems in measurement in research - Validity and Reliability. Levels of measurement- Nominal, Ordinal, Interval, Ratio.

UNIT III
Data Collection and Analysis: Execution of the research, observation and collection of data, methods of data collection, data processing and analysis strategies, data analysis with statistical packages, hypothesis testing, generalization and Interpretation, Univariate Analysis (frequency tables, bar charts, pie charts, percentages).

UNIT IV
Meaning of Interpretation, Need of Interpretation, Technique of Interpretation, Precaution in Interpretation, Layout of a Research Paper, Journals in Computer Science, Impact factor of

Journals, Ethical issues related to publishing, Plagiarism and Self-Plagiarism. Reports and Thesis Writing: Structure and components of scientific reports, Types of report- Technical reports and thesis, Writing-synopsis, abstract, illustrations and tables, results, summary, reference citing and Listing.

Text/Reference Books:

1. J. Garg, B.L., Karadia, R., Aggarwal, F, and Aggarwal, U.K., 2002. An Introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methedology: Methods and Techniques. New Age International.
3. Donald Cooper & Pamela Schindler, Business Research Methods, McGraw Hill.
4. Alan Bryman & Emma Bell, Business Research Methods, Oxford University Press.
5. N, Gurumani, Scientific Thesis Writing and Paper Presentation, MJP Publishers.
6. Montgomery, Douglas C., Design and Analysis of Experiments, Wiley India Pvt. Ltd.

MT-PT-33(i) CLOUD COMPUTING

L/T - 4   **Total Credits – 4**   **Internal - 30 Marks**
                                                                External – 70 Marks

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Course Learning Objectives
1. Basics of cloud computing.
2. Key concepts of virtualization.
3. Different Cloud Computing services
4. Cloud Implementation, Programming and Mobile cloud computing
5. Cloud Backup and solutions

Course Learning Outcomes:
1. Define Cloud Computing and memorize the different Cloud service and deployment models
2. Describe importance of virtualization along with their technologies.
3. Use and Examine different cloud computing services
4. Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing
5. Describe the key components of Amazon web Service
6. Design & develop backup strategies for cloud data based on features

UNIT I
Introduction: Essentials, Benefits and need for Cloud Computing - Business and IT Perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption.
Cloud Models: Cloud Characteristics - Measured Service - Cloud Models - Security in a Public Cloud Public versus Private Clouds - Cloud Infrastructure Self Service
Cloud as a Service: Gamut of Cloud Solutions - Principal Technologies - Cloud Strategy Cloud Design and Implementation using SOA - Conceptual Cloud Model - Cloud Service Defined

UNIT II
Cloud Solutions: Cloud Ecosystem - Cloud Business Process Management - Cloud Service Management - Cloud Stack - Computing on Demand (CoD) – Cloud sourcing.
Cloud Offerings: Information Storage, Retrieval, Archive and Protection - Cloud Analytics Testing under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud.
Cloud Management: Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability and Disaster Recovery - Charging Models, Usage Reporting, Billing and Metering.

UNIT III

Cloud Virtualization Technology: Virtualization Defined - Virtualization Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Logical Partitioning (LPAR) - VIO Server - Virtual Infrastructure Requirements.

Cloud Virtualization: Storage virtualization - Storage Area Networks - Network-Attached storage - Cloud Server Virtualization - Virtualized Data Center.

UNIT IV

Cloud and SOA: SOA Journey to Infrastructure - SOA and Cloud - SOA Defined - SOA and IaaS - SOA-based Cloud Infrastructure Steps - SOA Business and IT Services.

Cloud Infrastructure Benchmarking: OLTP Benchmark - Business Intelligence Benchmark - e-Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection and Performance Monitoring Commands - Benchmark Tools.

Text/Reference Books:

1. Roger Jennings, Cloud Computing, Wiley India
2. John Rhoton, Cloud Computing Explained, Recursive Press
3. Barry Sosinsky, Cloud Computing Bible,Wiley
4. Rajkumar Buyya, James Broberg, Cloud Computing: Principles and Paradigms, Wiley
5. Judith Hurwiz, Cloud Computing for Dummies,Wiley Publishing.
6. Rosenberg and Matheos, The Cloud at your service, Manning Publications
7. Dr. Kumar Saurabh, Cloud Computing – Insight into New Era Infrastructure , Wiley India.

MT-PT-33(ii) GRID COMPUTING

L/T - 4   **Total Credits – 4**   **Internal - 30 Marks**
                                                     External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Course Learning Objectives: The course is aimed at following:
1. To discuss the basic idea behind the grid computing.
2. To learn the concepts of grid security and resource management.
3. To understand the concept of grid portals
4. To learn the concept of grid middleware.
5. To learn how to set up and administer a grid

Course Learning Outcomes: At the end of the course, a student will possess the following:
1. A fair knowledge about the objectives of grid computing
2. A fair knowledge of grid computing and its basic principles
3. Knowledge about the cost efficient and high performance computing systems
4. Idea about the concepts related to design and architecture of grid computing
5. A basic knowledge about the technology application for grid computing.

UNIT I
Introduction: Cluster and Grid computing, Meta-computing, Web services and Grid Computing, e-Governance and the Grid
Technologies and Architectures for Grid Computing: Issues in Data Grids, Functional requirements in Grid Computing, Standards for Grid Computing, Recent technologies trends in Large Data Grids.

Web Services and the Service Oriented Architecture: Service Oriented Architecture, SOAP and WSDL, Creating Web Services, Server Side.

UNIT II
OGSA and WSRF: OGSA for Resource Distribution, Stateful Web Services in OGSA, WSRF, WSRF Specification
Globus Toolkit: History, version, Applications, Approaches and Benefits, Infrastructure Management, Monitoring and Discovery, Security, Data Choreography and Coordination, GT4 Architecture, GT4 Containers.
The Grid and Databases: Requirements, Storage Request Broker, Integration of Databases with the Grid, Architecture of OGSA-DAI for offering Grid Database services.
UNIT III
Cluster Computing: Approaches to Parallel Computing, Definition and Architecture of a Cluster, Categories of clusters.

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Cluster Middleware: Levels and Layers of Single System Image, Design objectives, Resource Management and Scheduling, Cluster programming Environment and Tools.

Networking, Protocols and I/O for clusters: Networking and Interconnection/Switching Devices, Design Issues, Design Architecture, HiPPI, ATM, Myrinet, Memory Channel

UNIT IV

Setting Up and Administering a Cluster: Setup of simple cluster, setting up nodes, clusters of clusters, System monitoring, Global Clocks Sync.

Cluster Technology for High Availability: High availability clusters, high availability parallel computing, types of failures and errors, cluster architectures and configurations for high availability, Failure/Recovery clusters.

Process Scheduling: Job management System, Resource management system, policies of resource utilization, Scheduling policies.

Load Sharing and Load Balancing: Introduction, Strategies for load balancing, Modelling parameters.

Text/Reference Books:
1. Grid and Cluster Computing by C.S.R. Prabhu, PHI
2. The Grid: Blueprint for a New Computing Infrastructure, Ian Foster, Carl Kesselman, Elsevier Series, 2004.
3. Grid Computing for Developers, Vladimir Silva, Charles River Media, January 2006.
4. Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High Performance Computing: Paradigm and Infrastructure, Laurence Yang and Minyi Guo (editors), Wiley Press, New Jersey, USA, June 2005. 4
5. Grid Resource Management: State of the Art and Future Trends, Jarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz, International Series in Operations Research & Management Science, Springer; First edition, 2003

MT-PT-33(iii) QUANTUM COMPUTING

L/T - 4   **Total Credits – 4**   **Internal - 30 Marks**
                                                               External – 70 Marks

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Course Learning Objectives: The course is aimed at following:
1. To introduce the fundamentals of quantum computing
2. To understand the problem solving approach using finite dimensional mathematics
3. To learn the algebra of complex vector spaces and quantum mechanics

Course Learning Outcomes: On successful completion, students will gain understanding about:
1. The basic principles of quantum computing.
2. The fundamental differences between conventional computing and quantum computing.
3. Several basic quantum computing algorithms.
4. The classes of problems that can be expected to be solved well by quantum computers.

UNIT I
Introduction to Quantum Computation: Concept and need of quantum computing, Quantum bits and quantum operations, Postulates of quantum mechanics, Bloch sphere representation of a qubit, multiple qubits, classical gates versus quantum gates.

UNIT II
Background Mathematics and Physics: Hilber space, Probabilities and measurements, entanglement, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis.
Quantum Circuits: single qubit gates, multiple qubit gates, design of quantum circuits

UNIT III
Quantum Information and Cryptography: Comparison between classical and quantum information theory. Bell states. Quantum teleportation. Quantum Cryptography, no cloning theorem, Quantum programming languages, Probabilistic and Quantum computations.

UNIT IV

Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor factorization, Grover search.
Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation

Text/Reference Books:
1. Quantum computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008

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2. Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, Benenti G., Casati G. and Strini G., World Scientific, 2004.
3. An Introduction to Quantum Computing Algorithms, Pittenger A. O., 2000.
4. Quantum computing explained, David McMahon, John Wiley & Sons, Inc. Publication 2008
5. Quantum computation and quantum information, Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press 2010
6. Introduction to Quantum Mechanics, 2nd Edition, David J. Griffiths, Prentice Hall New Jersey 1995
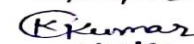
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