DETAILED SYLLABUS FOR THE POST OF LECTURER IN COMPUTER APPLICATION & BUSINESS MANAGEMENT (GOVT. POLYTECHNICS) IN TECHNICAL EDUCATION (POLYTECHNICS) - DIRECT RECRUITMENT (Category Nos.:126/2023)

I . C Programming (8 Marks)

Introduction to programming paradigms –Structure of C program –Data Types – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Preprocessor directives – Compilation process. Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search. Modular programming – Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference. Structure – Nested structures – Pointer and Structures – Array of structures – Self referenced structures – Dynamic memory allocation – Singly linked list.

II. Data Structure and Algorithms (5 Marks)

Nonlinear Data Structures-Concepts and terminologies of Trees, binary tree implementation and traversals; AVL tree-importance, left and right rotations of tree; B trees and B+ trees; Red Black Tree; Graphs – representations and traversals, Spanning Tree, Minimum Spanning Tree; Analyzing Algorithms- Asymptotic notations, Recurrences; Dynamic Programming-Multistage Graphs, All Pairs Shortest Path; Randomized Algorithms; String Matching algorithms, Branch and Bound – Travelling Salesman Problem. P and NP-class problems

III. Operating Systems (6 Marks)

Introduction to Operating Systems, Definition of OS, Layers of OS; Types of Operating Systems - single user & multi user OS, batch processing OS, Time sharing OS, Real Time OS; Operating System Techniques - Multiprogramming, Multitasking, Multithreading, Multiprocessing; Some Popular Operating Systems - DOS (Disk Operating System), UNIX Operating System, Linux, Microsoft Windows, Microsoft Windows NT, Mobile Operating systems

IV. Database Management System (8 Marks)

Define Field, Record, Database, Distinguish between Physical record and Logical Record, Explain Advantages of DBMS, Understand Schema, Subschema - Instances, Three schema architecture, Define data independence. Explain Storage manager, Query processor, Disk storage, Database Users, Explain various Database system application architectures like Centralized DBMS architecture, Basic client/server architecture, Two tier client/server architectures, and three tier client/server architecture, Understand Data models, Explain ER model, Define Entity, Attribute, Keys, Relationship types, Relationship set, Define Primary key, Candidate key, Super key, Explain ER diagram, Weak entity set, Describe EER Model: Subclasses - Super classes - Inheritance - Specialization - Generalization. Object Oriented

Database Management Systems: Concepts, Composite objects, Issues in OODBMSs, Advantages and Disadvantages of OODBMSs.

V. Computer Hardware & Networking (8 Marks)

TCP/IP Reference model- an overview, TCP: features, segment structure, connection management, IP: functions, IPV4 datagram format, Addresses, IPV6, Network Programming – Sockets, TCP, UDP. Routing Algorithms: Optimality principle, Shortest path algorithm, Flooding, Distance vector routing, Link state routing, Hierarchical routing, Broadcast routing, Anycast Routing, multicast routing. Routing in the Internet- Interior gateway routing

protocols: OSPF, RIP, Exterior gateway Routing Protocols: BGP. Error detection and correction: Error detection codes- Parity, Checksums, Cyclic Redundancy Checks (CRCs). Error correction codes- Hamming codes, Binary convolutional codes, Reed-Solomon codes, Low-Density Parity Check codes. Wireless LAN(802.11)-Architecture, Frame structure, Services- WEP (Wired Equivalent Privacy),WPA2, Broadband Wireless- WiMAX(802.16), Architecture, Frame structure, Bluetooth – Architecture, Applications, Frame structure. Cryptography: Encryption, Symmetric and Asymmetric cryptography, DES, AES, RSA, Key Management-Diffie-Hellman Key Exchange.

VI. Visual Programming (6 Marks)

.NET Framework - CLR - .NET Class Library - .NET. Languages - Variables - Constants - Data Types - Operators - Expressions. Control Statements: If Then - If Then Else - Select Case – Looping. Statements: Do While - For - Exit - Continue - Arrays - Single Dimensional - Multidimensional - Object Arrays. Window Forms - Form Attributes - TextBox - Label - Combo Box - List Box - Check Box - Radio Button - Timer - Menu - Dialog Boxes - MsgBox - Input Box - Events - Form Events - Keyboard Events - Mouse Events - Exceptions - Try Catch - Crystal Reports - Database Fields - Special Fields - Summary Fields – Lines. ADO .NET - Architecture - Connection - Command - Data Adapter - DataSet - DataTable - DataRow - ASP .NET - Forms - Controls.

VII. Object Oriented Analysis and Design (6 Marks)

Object Oriented Systems development life cycle. Object oriented Methodologies- Booch's Methodology - Rambaugh's Methodology , Jacobson's Methodology-
Patterns and
Frameworks. Fundamentals of Object Oriented design using Unified Modeling Language, UML- Use case diagram- Class diagram- Sequence diagram- collaboration diagram-State chart diagram- Activity diagram- Component diagram- deployment diagram. Object oriented analysis: Use Case Model- Identifying use cases Identifying actors- Documentation- Object analysis - Classification-different approaches- Identifying Classes- Identifying Object relationships – Attributes and Methods. Object oriented design: Design process- Design axioms - Colloraries- Design Patterns- Designing Classes - Designing Protocols and Class visibility - Defining Attributes- Designing Methods-Guidelines for identifying bad design. Agile Software Development - Agile Practices & Principles- Extreme Programming- Practices- Planning- Initial Exploration- Release and Iteration Planning- Defining "Done"- Task Planning- Iterating - Tracking, Testing- Test-Driven Development- Acceptance Tests, Serendipitous Architecture

VIII. Cyber Security (3 Marks)

Information System Threats and attacks, Classification of Threats and Assessing Damages, Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations. Basic Principles of Information Security-Confidentiality, Integrity Availability. Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of Biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges. Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection. Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security 2 | Pa geLecturer in Computer Application & Business Management (Polytechnics) in Technical Education Department
Concerns in VPN. Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mining Security. Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes.

IX. Machine Learning (5 Marks)

Introduction to Machine Learning- Components of learning, learning models, Types of Machine Learning, Introduction to Supervised Learning and Unsupervised Learning- Reinforcement learning. Supervised Learning- Regression - Classification, Classifiers: Support Vector Machines- K Nearest Neighbour, Kernel- Decision Trees. Unsupervised Learning - K Means algorithm- Dimensionality Reduction, Principal components analysis - Linear Discriminant Analysis. Artificial Neural Networks – Introduction, Neuron model, Single layer, Multi layer feed forward network, Learning algorithm, Back propagation network.

X. Python Programming (5 Marks)

Structure of a Python Program, Functions, Interpreter shell, Indentation. Identifiers and keywords, Literals, Strings, Basic operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment Operator, Bit wise operator). Building blocks of Python: Standard libraries in Python, notion of class, object and method. Input and Output Statements, Control statements:-branching, looping, Exit function, break, continue and pass, mutable and immutable structures. Testing and debugging a program. Built-in data structures: Strings, lists, Sets, Tuples and Dictionary and associated operations. Visualization using 2D and 3D graphics: Visualization using graphical objects like Point, Line, Histogram, Sine and Cosine Curve, 3D objects. Exception Handling and File Handling.

Business Management

Maximum Marks: 40

Module 1 : Business Management : Introduction - Concept of Management - Scientific Management - History of Scientific Management - Contribution of FW Taylor and Henry Fayol- Modern Management - Contribution of Peter Drucker - Functions of Management - Functional Management - Universality of management - Environmental scanning for business manager - Tools of environmental scanning - Ethical dilemmas in business - Corporate social responsibility.

(8 Marks)

Module 2 : Operations Management : Introduction - Concept of operations management - Role of Operations management - Production methods - Product Planning, Control and design - Productivity - Location -production planning - Scheduling- Capacity planning - Research and development - Crisis management and contingency planning- Total quality management -Quality management systems - ISO 9000 - ISO 14000 -BIS - Emerging trends in operations management - Six sigma - Agile manufacturing - Lean production - Green manufacturing.

(8 Marks)

Module 3 : Human Resource Management : Introduction - Concept of human resource management - Evolution of human resources management -Functions of human resource management - Organizational structure - Leadership - Motivation - Theories of motivation - Performance appraisal - Job analysis - Job evaluation - Organizational culture - organizational behavior - Workers participation in management - Industrial relations - Dispute settlement machinery

(8 Marks)

Module 4 : Marketing Management : Introduction - Concept of marketing management - Evolution of marketing - Functions of marketing - Marketing planning- Sales forecasting - Consumer behavior - Marketing research- Marketing mix- Extended marketing mix - Advertising and sale promotion - Product and pricing decisions - International marketing - Emerging trends in marketing - E Commerce M- Commerce - Social marketing - Digital marketing - social media marketing - Influencer marketing - Ethics in marketing.

(8 Marks)

Module 5 : Financial Management : Introduction - Concept of financial management - Scope and objectives of financial management - Sources of finance - Securities market - Financial planning and financial forecasting - Tools of financial forecasting - Finance functions - Cost of capital - Financing decisions - investment decisions-divident decisions - working capital management - Inventory management - Cash management- Receivable management - Budget and bedgetary control - Financial re-engineering.

(8 Marks)

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.