

## **Syllabus for Written & Practical Exam for the Post of Programmer.**

### **COMPUTER SCIENCE/ COMPUTER APPLICATIONS**

**30 Marks**

1. **COMPUTER PROGRAMMING USING 'C':**  
Algorithm and Programming Development, Program Structure, Control Structures, Functions, Arrays, Pointers, Structures and Unions, Strings, Files.
2. **DATABASE MANAGEMENT SYSTEM (RDBMS):**  
Database System Concepts and Architecture, Data Modeling using E.R. Model (Entity Relationship Model), Relational Model, Normalization, Database Access and Security, MYSQL/SQL (Structured Query Language)
3. **OPERATING SYSTEMS:**  
Process Management Functions (Principles and Brief Concept); Job Scheduler, Process Scheduler, Process synchronization. Memory Management Function (Principles and Brief Concept); Introduction, Single Process System, Fixed Partition Memory, System Loading, Segmentation, Swapping, Simple Paging System, Virtual Memory. I/O Management Functions (Principles and Brief Concept); Dedicated Devices, Shared Devices, I/O Devices, Storage Devices, Buffering, Spooling. File Management; Principles and Brief Concept, Types of File System; Simple file system, Basic file system, Logical file system, Physical file system. Dead Lock; Condition for Dead lock, Dead Lock Preventions, Dead Lock Avoidance.
4. **DATA STRUCTURES:**  
Problem solving concept, top down and bottom up design, structured programming, Concept of data types, variables and constants, Concept of pointer variables and constants, Arrays, Linked Lists, Stacks, Queues and Recursion, Trees, Search algorithm (Linear and Binary), Concept of sorting, sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort) and their comparisons.
5. **OBJECT ORIENTED PROGRAMMING USING C++:**  
Fundamentals of object oriented programming - procedure oriented programming. Object oriented programming concepts - Classes, reusability, encapsulation, inheritance, polymorphism, dynamic binding, message passing, data hiding, Review of constructs of C used in C++ : variables, types and type declarations, user defined data types; increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input and output statement, loops, switch case, arrays, structure, unions, functions, pointers; preprocessor directives, Classes and Objects, Member Functions, Overloading Member Functions, Inheritance, Polymorphism and Virtual Functions, File and Streams.
6. **JAVA PROGRAMMING:**  
Java Virtual Machine (JVM). Java In Time (JIT) compiler, JDK, Working with data types, control flow statements, arrays, casting, command line argument, Java Classes and Memory Management, Interfaces and Packages, Exception Handling and Stream Files, Threads and Multi-threading, Java Data Base Connectivity (JDBC).
7. **VISUAL PROGRAMMING USING (.NET):**  
Introduction to .NET framework, feature of .Net framework, architecture and component of .Net, VB.NET Basics. Visual Basic, .NET Programming Language-Variables & Data Type, Strings, Arithmetic Operators, Building the project, Common Control Controls, Functions Call and Arguments, Select Case, Loops, Nesting of Loops, Decision Structures, Error handling using Try..., Catch Block, Database Connectivity.

**8. SOFTWARE ENGINEERING:**

Size factors, Quality and productivity factors, Management issues, Models: waterfall, spiral, prototyping, fourth generation techniques, s/w process, Introduction to agile technologies.

Cost factors, cost estimations techniques, Staffing level estimation, estimating software maintenance costs, COCOMO.

Problem analysis, requirement engineering. The software requirements specifications (SRS). formal specifications techniques, characteristics of a good SRS.

Quality assurance work through and inspections static analysis, symbolic execution unit testing, formal verifications. Black box and white box testing techniques.

Definition of Quality, Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Inspections, Walkthroughs, Formal Technical Reviews, Review Guidelines, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126, CMM, TQM, TQM principles, Six Sigma, SPICE.

Risk Management and Configuration Management.

**9. COMPUTER NETWORKS:**

Concept of network, Models of network computing, Networking Models, Peer-to-peer Network, Server Client Network, LAN, MAN and WAN, Network Services, Topologies, Concept of switching, Switching Techniques, OSI Reference Model.

Concept of physical and logical addressing, Different classes of IP addressing, special IP address, Sub netting and super netting, Loop back concept, IPV4 and IPV6 packet Format, Configuring IPV4 and IPV6.

Network Security, Introduction to basic encryption and decryption, concept of symmetric and asymmetric key cryptography, overview of DES, RSA and PGP, Introduction of Hashing: MD5, SSL, SSH, HTTPS, Digital Signatures.

Computer Network Attacks, Active Attacks, Passive Attacks, Stealing Passwords, Social Engineering, Bugs and Backdoors, Authentication Failures, Protocol Failures, Information Leakage, denial-of-Service Attacks, Botnets, Phishing Attacks.

**10. INTERNET AND WEB TECHNOLOGIES:**

Telephone line, cable, leased line, ISDN, VSAT. RF link. World Wide Web and its evolution, web page, web server, HTTP protocol, Examples of web servers. Navigation Tools: Mozilla Firefox, Google Chrome, Internet Explorer, Uniform Resource Locator (URL). Hypertext, hyperlinks and hypermedia, URL, its registration, browsers, search engines, proxy servers.

Basics of authentication and authorization. Introduction to firewall, various techniques of encryption and decryption, SSL (Secure Socket Layer).

**11. Artificial Intelligence, The Propositional and Predicate Logic, and application areas: games playing, automated, reasoning and theorem proving, expert systems, Natural Language Processing.**

**12. Machine learning, Supervised learning, Unsupervised Learning, Examples and Applications of supervised Learning Examples and Applications of Unsupervised Learning, Classification Algorithms: Naive Bayesian Classifiers, Decision Tree, Random Forest, Convolutional Neural Networks, Recurrent Neural Networks, Backpropagation through time (BPTT), LSTMs (Long Short term Memory Neural Networks).**

**13. E-Commerce Challenges and Issues, Securing the Network Transactions-Cryptography – Encryption, Public Key Encryption vs Private key Encryption, Security Protocols for web Commerce – SSL, SET, SHTTP. Electronic Payment system. Pre, Post and Instant Payment methods in e-commerce, Digital Cash, Properties, Electronic Cheques and benefits, online credit card system, types of credit cards payments, secure electronic transactions, Debit Cards, E-benefit transfer.**

14. Cyber Laws, Jurisprudence of Indian cyber Law, Cyber crimes and criminal protection.
15. IT ACT2000 objectives, E-governance, digital signature, Sections related to Electronic records, Attribution, Acknowledgement and dispatch of Electronic Records, security of E-records and digital signature, Controller functions, Certificates, subscriber duties, Penalties and Adjudications, Cyber regulation Appellate tribunal, Offences, Contracts in the InfoTech world, IT Act Modifications. Cyber consumer protection.
16. Bit coin Transactions, Transaction Blocks, Blockchain, Mining, Bitcoin Addresses, Wallet technology, Transaction inputs and outputs, Transaction Script, Digital Signature, Advanced Concepts in Transactions and scripting.  
The Bit coin Network: Peer to Peer Network Architecture, Full Nodes and SPV Nodes, Encryption and authentication in connections, Transactions Pool, Structure of Block, Block Header, Block Header Hash and Height, Genesis Block, Markle Trees, Linking Blocks in chains.  
Mining and Decentralized consensus, Aggregating Transactions in Blocks, Mining the Block, Validating Block, Mining and the Hashing Race, Consensus Attacks, Bit coin Security principles and best practices, Block Chain Applications.
17. Software Defined Networking (SDN): Separation of Control Plane and Data Plane, IETF Forces, Active Networking, the Open Flow Protocol.  
Network Virtulization: Concepts, Applications, Existing Network Virtulization Framework (VMWare and others), Mininet based examples.  
Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs.  
Network Functions Virtulization (NFV) and Siftware Defined Networks: Concepts, Implementation and Applications.  
Data Center Networks: Packet, Optical and Wireless Architures, Network Topologies.  
Use Cases of SDNs: Data Centres, Internet Exchange Points, Backbone Networks, Home Networks, Traf.
18. Information Storage and Management – Cloud Computing:  
Understanding Cloud Computing, Fundamental Concepts and Models & Cloud-Enabling Technology, Fundamental Cloud Security, Cloud Infrastructure Mechanisms, Specialized Cloud Mechanisms, Cloud Management Mechanisms, Cloud Security Mechanisms, Fundamental Cloud Architecture, Advanced Cloud Architecture, Specialized Cloud Architecture, Cloud Delivery Considerations, Cost Metrics and Pricing Models, Service Quality Metrics and SLAs.
19. Server Administration:  
Introduction of Windows Server, Installation of Windows Server, Configuring the Windows Server, Windows Server Patch Management, Securing Windows Server, Windows Sever Security, Managing Windows Server & Network Services, Introduction to Active Directory and Account Management, Installation of Active Directory, Application and Data Provisioning, Installation of SQL, Configuring User Access and Group Policies, Installation of Web Server.
20. Website Management  
Web Development concept, WebPages, Websites, and hosting sites, Basic idea of HTML tags and CSS tags, Introduction to Python, Sequences and Iteration, Conditionals, Functions, Libraries, Implementation of Drupal Web Framework, Introduction to Concept of JavaScript, Developing WebPages using PHP and Drupal.

**GENERAL ENGLISH****10 Marks**

- (i) Tenses
- (ii) Comprehension
- (iii) Editing / Proof Reading.
- (iv) Rearranging of jumbled sentences
- (v) Narration
- (vi) Modals
- (vii) Articles
- (viii) Paragraph writing with blanks to be filled in with the following
  - i. Phrases
  - ii. Pronouns
  - iii. Homonyms/Homophones etc.
- (ix) Clauses
- (x) Punctuation
- (xi) Synonyms and antonyms
- (xii) Idioms and phrases.
- (xiii) Uses of Prepositions
- (xiv) Active & Passive Voice
- (xv) Error Spotting
- (xvi) Sentence Correction
- (xvii) Spelling Correction

**SHRI MATA VAISHNO DEVI SHRINE, CULTURE & MYTHOLOGY****10 Marks****PRACTICAL TEST OF COMPUTER SCIENCE/ COMPUTER APPLICATIONS** **30 Marks**

(Syllabus same as per written exam for Computer Science & Computer Applications)

**PERSONAL INTERVIEW/ VIVA VOCE****20 Marks****GRAND TOTAL****100 Marks**