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Resham Ghar Colony, Bakshi Nagar, Jammu

NOTICE
DATED: 02.02.2017

The syllabus for conducting Written Test [Multiple Choice Questions (MCQs)] in **Information Technology** for the posts of Lecturer (10+2) in School Education Department is notified for the information of the concerned candidates as under:

SUBJECT: INFORMATION TECHNOLOGY

Database System

Unit-I:
Database System Applications, Purpose of Database Systems, View of data, Database Languages, Relational Databases, database Architecture, Database Models and comparison, relation Algebra, ER Model, CODDS Rules, Normalisation.

Unit-II:
Introduction to SQL, Data types, Data Definition Language, Data Manipulation Language, Transaction Control language, Integrity Constraints, SQL Functions, Set Operators and Joins, View, Synonym and Index, Sub Queries and Database Objects, Locks and SQL Formatting Commands.

Unit-III:
Introduction to PLSQL, Architecture, Data Types, Control Structure, Concept of Error Handling, Cursors and Database Triggers, Subprogram and Packages.

Unit-IV:
Data Storage and Querying using various storage structures, Indexing and Hashing, Query Processing and Optimization, Transaction Management Concepts, Concurrency Control and Recovery.

Programming with C/C++

Unit-I:
Arrays: Declarations; initialisation; 2-dimensional and 3-dimensional array, passing array to function, strings and string functions and character arrays. Pointers: variables, swapping data, swapping address v/s data, misuse of address operators, pointers and arrays, pointers to pointers, strings, pointer arithmetic, additional operators, portability, pointers to functions, using pointers with arrays, void pointers. Structures and unions: Syntax and use, members, structures as function arguments, structure pointers, array of structures as arguments, passing array of structure members, call by reference.

Unit-II:
Functions, prototype, passing parameters, storage classes, identifier visibility. Recursive functions, Command line arguments. Scope rules, Multi-file programming, Introduction to macros. File processing in C and C++, Introduction to graphics, graphic initialisation, graphic modes, drivers, basic drawing functions. Animations – concept and implementation, Building graphical user interface.

Unit-III:
Introduction to classes and objects; Constructor; destructor; operator overloading; Function overloading; function overriding; friend function; copy constructor; Inheritance; Single, Static binding; Virtual functions; Pure virtual function; concrete implementation of virtual functions; Dynamic binding call mechanism; Implementation of polymorphism; virtual destructors.

Unit-IV:
Templates: Function Templates, Class Templates, Class Templates, Member Function Template and Template Arguments, Exception Handling, Standard Template Library.

Operating System:

Unit-I:
Overview of an Operating System, Resource Management, Operating System Interface, Process Management Concepts, Inter-Process Communication, Process Scheduling, Synchronisation, Deadlocks.

Unit-II:
Memory Management, Linking, Loading, Memory Allocation, design Issues and Problems, Virtual Memory, Fragmentation, implementing Virtual Memory, paging, Segmentation, Virtual Memory Design Techniques, Buffering Techniques, Spooling.

Unit-III:
File Management: File Systems and I/O, Device Drivers, Access Strategies, File Systems, File System Organisation, Design techniques, Multiprocessor System, Types of Multiprocessor Operating Systems, Design and Implementation Issues.

Unit-IV:
Unix/Linux Operating Systems, Users View, Design Principles, Implementation, Process Management, Memory Management, File System, I/O System.

Pervasive Computing:

Unit-I:
Technologies: Past, Present, Future, Pervasive Computing, The Pervasive Computing Market, m-Business, Conclusion and Challenges, Future, Application Examples, Device Technology: Hardware, Human-machine interfaces, Biometrics, Operating Systems, Java for Pervasive devices, Device connectivity: Protocols, Security, Device Management, Web Application Concepts: History of World Wide Web, World Wide Web Architecture, Protocols, Transcoding, Client Authentication via the Internet.

Unit-II:
WAP: Introduction, Components of the WAP architecture, WAP infrastructure, WAP Security issues, Wireless Markup Language, WAP Push, Products, i-mode, Voice Technology: Basic of Speech recognition, Voice standards, Speech Applications, Speech and pervasive computing, security, personal Digital Assistants: history, device Categories, PDA operating systems, Device characteristics, Software Components, Standards, Mobile Applications, PDA browsers.

Unit-III:
Architecture: Server Side Programming in Java, J2EE and overview, Servlets, Enterprise Java Beans, Java server pages, Extensible Markup Language, Web Services, Model-View-Controller Pattern, Pervasive web application architecture,: Background, scalability and availability, Development of pervasive computing web application, Pervasive application architecture.

Unit-IV:
Example Application: Introduction, User Interface overview, Architecture, Implementation, Access from PCs, Smart card based authentication via the Internet, Ordering goods, Access via WAP: WAP functionality, implementation, Access from Personal Digital Assistants: Extending the example application to personal digital assistants, Implementation for synchronised devices for intermittently connected devices, for concerned devices, Access via voice: Extending the example application to voice access, Implementation.

Data Communication:

Unit-I:
Bandwidth and Channel Capacity, Quantifying Channel Capacity for noiseless channel (Nyquist Law) and noisy channel (Shannon's Law), Example of a digital telephone system to explain basic concepts of analog signals, digital signals, sampling, Data Rate versus Baud rate, Nyquist Criterion for Sampling, data transmission concepts, Characteristics of signals (amplitude, frequency, period, wavelength, Signal to Noise ratio), Key components in data communication systems, Simplified model, Local Area Network (LAN) concepts and characteristics.

Unit-II:
Wide Area Network (WANs), WAN technologies (traditional packet and circuit switching, Frame Relay, ATM), ISD (narrowband) concepts and services. Overview of the OSI model, Transmission media-factors affecting distance and data rate. Guided transmission media, Twisted pair, Co-axial cable, Principles and advantages of optical networks, Types of optical fibers and lasers.

Unit-III:
Unguided transmission media: Terrestrial Microwave and Satellite Microwave systems and applications, Data encoding, Difference between modulation and encoding, NRZ-L, NRZ-I encoding, Multilevel Binary and biphase Coding techniques and their implementations, ASK, FSK, PSK AND QPSK, PCM concepts: Sampling, quantization, Delta Modulation, Amplitude Modulation.

Unit-IV:
Reliable transmission of data: Asynchronous and Synchronous transmission, error detection: Parity based, CRC-based, FCS computation, Error control and recovery techniques, Concept of ARQ standard and its versions, Concept of Multiplexing, FDM, synchronous and Statistical TDM.

Discrete Mathematics

Unit-I:
Proposition, Logic, Truth tables, Proportional Equivalence, Predicates and quantifiers, Sets: operations on sets, Computer representation of sets, Functions: Domain, Range, One to One, Onto, Inverses and Composition, cardinality of a set. Sequences and summations. The growth of functions, Methods of Proof: Different methods of proof, Direct proof, Indirect Proof, mathematical Induction for Proving algorithms.

Unit-II:
Counting: Basic Counting principle, The Pigeon-Hole Principle, Permutation Combinations, repetitions, discrete probability, Advanced Counting Techniques: Inclusion-Exclusion, Applications of Inclusion-exclusion principle, recurrence relations, solving recurrence relation, Relations: Relations and their properties, Binary Relations, Equivalence relations, Diagraphs, matrix representation of relations and diagraph, Computer representation of relations and diagraphs, Transitive Closures, Warshall's Algorithm.

Unit-III:
Partially Ordered Sets (Posets), External elements of partially ordered sets, Hasse diagram of Partially ordered set, isomorphic ordered set, Lattices: properties of Lattices, Complemented Lattices, Graph Theory: Introduction to Graphs, Graph Terminology Weighted graphs, representing Graphs, Connectivity of Graphs: Paths and Circuits, Eularian and Hamiltonian Paths, Matrix representation of graphs, Graph coloring.

Unit-IV:
Trees: Rooted trees, Application of trees: Binary Search Trees, Decision Trees, Prefix Codes, Tree traversal, trees and sorting, spanning trees, minimal spanning trees, Finite Boolean algebra, Function on Boolean algebra, Boolean functions as Boolean polynomials, Groups and applications: Subgroups, Semigroups, Monoids, Product and quotients of algebraic structures, Isomorphism, Homomorphism.

Fundamentals of Grid and Cloud Computing

Unit-I:
FUNDAMENTAL OF GRID COMPUTING: The Grid – Past, Present and Future – Applications of Grid Computing Organisation and their Roles.
GRID COMPUTING ARCHITECTURE: Grid Computing Anatomy – next Generation of Grid Computing Initiatives – Merging the Grid Services Architecture with Web Services Architecture.

Unit-II
GRID COMPUTING TECHNOLOGIES
OGSA – Sample Use cases that drive OGSA Platform Components – OGSI and WSRF – OGSA Basic Services – Security Standards for Grid Computing – High Level Grid Services.

Unit-III:
FUNDAMENTALS OF CLOUD COMPUTING
Fundamentals – Short history of Cloud computing – Cloud Architecture – Cloud Storage – Cloud Service – Pros and Cons of cloud computing – Benefits from cloud computing.

Unit-IV:
CLOUD SERVICES
Need for Web Based Application – The cloud service development – Cloud Service, Development Types – Cloud Service development tools.

Sd/-
(Shakeel Ul Rehman)
Secretary & Controller of Examinations

No: PSC/DR/Syllabus/2016/ Dated: 02.02.2017

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3. Deputy Secretary/Under Secretary, J&K Public Service Commission.
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