सीएसआईआर–भारतीय पेट्रोलियम संस्थान
CSIR-Indian Institute of Petroleum
वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद
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अधिसूचना /NOTIFICATION

No. 3(541)/2017-Pers

July 28, 2020

विषय: विज्ञापन संख्या 04/2018: **पद कोड IT-1 तथा IT-2 की लिखित व ट्रेड परीक्षा हेतु पाठ्यक्रम**

Subject: Advt. No. 04/2018 : Syllabus for Trade Test and Written Examination for Post Codes IT-1 and IT-2

इस संस्थान के विज्ञापन संख्या 04/2018 तथा समसंख्यक अधिसूचना दिनांक 24.06.2020 जिसके माध्यम से पद कोड IT-1 तथा IT-2 के दो पदों को छोड़ कर 10 पदों हेतु ट्रेड तथा लिखित परीक्षा का पाठ्यक्रम अधिसूचित किया गया था, के अनुक्रम में अब, पद कोड IT-1 तथा IT-2 का ट्रेड तथा लिखित परीक्षा का पाठ्यक्रम सभी अभ्यर्थियों की सूचनार्थ अधिसूचित किया जा रहा है।

In continuation of this Institute's Advt. No. 04/2018 and notification of even No. dated 24.06.2020, whereby syllabus for Trade-Test and Written Examination in respect of 10 posts except for two posts of IT-1 & IT-2 was notified, now the syllabus for Trade-Test and Written Examination for Post Codes IT-1 and IT-2 is being notified for information of all concerned.

लिखित परीक्षा के अन्य विवरण अर्थात दिनांक, समय, स्थान, प्रवेश पत्र इत्यादि संबन्धित सूचना अभ्यर्थियों को ईमेल तथा पोस्ट द्वारा सूचित कर दी जाएगी तथा संस्थान की वैबसाइट पर भी उपलब्ध होगी / Other details i.e. date, time, venue, admit cards etc. of trade/written test will be made available on our website under intimation to concerned candidates through e-mail and post.

अतः सभी उम्मीदवारों को सलाह दी जाती है कि वे संस्थान की वैबसाइट को अद्यतन सूचना हेतु देखते रहें / The Candidates are advised to visit our website www.iip.res.in regularly for updates.

29.07.2020

(प्रशासन नियंत्रक)

प्रति:

(1) सभी सूचना पट्ट / All Notice Boards
(2) प्रमुख IT – अधिसूचना को संस्थान के वैबसाइट मे अपलोड करने हेतु / For uploading Notification on CSIR-IIP Website

Advt. No. 04/2018: Syllabus for Post Code IT–1
Post: Technical Officer
Area: Information Technology

Database Management System

- File Based Data Management – Disadvantages of file system
- Database systems – Need for Database, Advantages of using a database
- Characteristics of data in a database – Functions of DBMS, Components of a database, Comparison between Database and file-processing systems
- Data dictionary – Data abstraction, Data independence – Logical and Physical data independence
- Architecture: Overall Architecture of DBMS
- Three level architecture - Hierarchical, Networking, Relational Data Models (E-R Model, E-R Diagrams, EER Model), Advantages and Disadvantages of each model.
- Advanced Concepts: Introduction to Data warehousing and Data mining – Different types
- Client/Server Technology: Client – Server – Distributed and Co-operative processing – Peer- to – Peer processing – Application components – Transaction management.
- Relational Structure – Characteristics of Relational Database Model – CODD's rules – Tables (Relations), Rows (Tuples), Domains, Attributes, Extension, Intention.
- Keys: Candidate Key, Primary Key, Foreign Key, Super Keys, Unique Keys.
- Data Constraints: Referential Integrity Constraints, Entity Integrity Constraints, Constraints like Primary key constraint, Unique, Check constraint strong Entity, Weak Entity.
- Normalization: Introduction – Purpose of Normalization – Definition of Functional Dependence (FD) Relational database Design, – Normal forms: 1NF, 2NF, 3NF, BCNF, 4Nf and 5 NF.
- Database Administration: DBA Tasks – DBA Tools – User Privileges – Performance monitoring and tuning – Query tracing – Backup and Recovery**.**
- Introduction to SQL: Advantages of SQL – Invoking SQL*PLUS, The Oracle Data-types, Data Definition Language (DDL), Data Manipulation language (DML), Data Control Language (DCL), Data Query Language (DQL) and all related commands.
- Queries using Group by and Order by clause & Join: Querying a Single Table, Ordering results, grouping the results, Joins, Types of Joins, Sub queries.
- Operators: Logical, Value, Syntax and Query expression operators – Set operators.
- Functions: Character, Arithmetic, Date and time, Group and Miscellaneous Functions, Commit, Rollback, Savepoint.
- Format models: Character, Numeric & Date Format models.
- Views: Introduction – Advantages of views – The Create View Command, Updating Views, Views and Joins, Views and Sub queries – Dropping Views.
- Sequences: Creating Sequences, Altering Sequences, Dropping Sequences.
- Indexes: Index Types, Creating of an Index: Simple Unique and Composite Index, Dropping Indexes.
- Snapshots: Creating a Snapshot, Altering Snapshot, Dropping a Snapshot.
- Introduction to PL/SQL: The PL/SQL Syntax, The PL/SQL Block Structure, Fundamentals of PL/SQL, Advantages of PL/SQL data Types.
- Control Structure: Conditional Control, Iterative Control, Sequential Control.
- Exception handling: Predefined Exception – User defined Exception.
- Cursors: Implicit and Explicit Cursors
- Procedures: Advantages – Creating – Executing and Deleting a Stored Procedure.
- Functions: Advantages – Creating – Executing and Deleting a Function.
- Database Triggers: Use of Database Triggers – How to apply database Triggers – Types of Triggers – Syntax for Creating Trigger – Deleting Trigger.

Data Communication and Networking

- Data Communication: Components of a data communication – Data flow: simplex – half duplex – full duplex; Networks – Definition – Network criteria – Types of Connections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology.
- Types of Networks: LAN – MAN – WAN – CAN – HAN – Internet – Intranet –Extranet, Client-Server, Peer To Peer Networks.
- Transmission Media: Classification of transmission media – Guided – Twisted pair, Coaxial, Fiber optics; unguided – Radio waves – Infrared – LOS – VSAT – cabling and standards
- Network devices: Features and concepts of Switches – Routers (Wired and Wireless) – Gateways.
- Network Models: Protocol definition – standards – OSI Model – layered architecture – functions of all layers.
- Data Link Layer: Framing & its methods, Flow Control, Error control. DLL Protocol, Piggybacking & Pipelining. MAC Sub layer, Media access control for LAN & WAN, collision, IEEE 802 standards for LAN & MAN & their comparison. Ethernet, Wireless LANs, Broadband Wireless, Bluetooth.
- Network Layer: Routing, Congestion Control Algorithms, IP protocol, IP Addresses, Comparative study of IPv4 & IPv6, Mobile IP.
- Transmission Control Protocol (TCP) – User Datagram Protocol, Data Traffic, Congestion Control and Quality of Service
- Network Security: Cryptography, Message Security, Digital Signature, User Authentication, Key Management, Security Protocols Internet, DNS, SMTP, FTP, HTTP, WWW, Virtual Terminal Protocol.

Operating System

- Introduction to System Programs & Operating Systems, Buffering & Spooling, Types of Operating System.
- File concepts, access methods, free space managements, allocation methods, directory systems, protection, organization, sharing & implementation issues, etc.
- Process: Concept, Process Control Blocks (PCB), Scheduling criteria Preemptive & non Preemptive process scheduling, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling, threads, critical section problem, semaphores, and classical problems of synchronization, etc.
- Memory Hierarchy, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation.
- Distributed operating system:-Types, Design issues, File system, Remote file access, RPC, RMI, Distributed Shared Memory(DSM), Basic Concept of Parallel Processing & Concurrent Programming
- Security & threats protection: Security violation through Parameter, Computer Worms & Virus, Security Design Principle, Authentications, Protection Mechanisms.

Software Engineering

- The Software Product and Software Process Models, Software Process customization and improvement.
- Requirement Elicitation, Analysis, and Specification Functional and Non-functional requirements, Validation, Trace ability.
- Software Design, Architectural Design, User Interface Design, Function-oriented Design, SA/SD Component Based Design, Design Metrics.
- Software Analysis and Testing, Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, Test Techniques, Black-Box Testing, etc.

- Software Maintenance & Software Project Measurement: Software Configuration Management (SCM), Re-engineering, Reverse Engineering. Project Management Concepts, Feasilibility Analysis, Project and Process Planning, Resources Project Scheduling and Tracking, etc.

Data Structure

- Introduction: Basic Terminology, Data types and its classification, Array Definition, Representation and Analysis of Arrays, Single and Multidimensional Arrays, etc.
- Stack, Array Implementation of stack, Linked Representation of Stack, Queue, Array and linked implementation of queues, Circular queues, D-queues and Priority Queues. Linked list, Generalized linked list.
- Trees: Basic terminology, Binary Trees, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, etc.
- Internal and External sorting ,Insertion Sort, Bubble Sort, selection sort Quick Sort, Merge Sort, Heap Sort, Radix sort, Searching & Hashing: Sequential search, binary search, Hash Table, Hash Functions, etc.
- Graphs: Introduction, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

Compiler Design

- Introduction to Compiler, Phases and passes, Bootstrapping, Implementation of lexical analyzers, LEX: lexical analyzer generator, Input buffering, Recognition of tokens, Error handling.
- Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers, LR parsers , an automatic parser generator
- Syntax directed definitions, L-attributed definitions, Syntax directed Translators, Intermediate code, etc.
- Symbol Tables, Run-Time Administration, simple stack allocation scheme, storage allocation in block structured language, Code Optimization and Code Generation
- Parsing control statements, syntax diagrams, Error Recovery, Interpreting control statements, parsing programs, procedures and Functions.

Computer Organization and Microprocessor

- Computer System: Basic Computer Operation, Machine Instructions, Addressing Modes, DLX Architecture,
- Computer Configuration, Memory organization, Memory Architecture and Interface, DMA, Synchronization, etc.
- Microprocessor As A CPU– types of Microprocessor, Microcomputers, Computer Languages, Flags, Program Counter(PC), Stack Pointer, OPCode Format, etc.
- Input-output System.

Object Oriented Programming (OOPS)

- General concept OOPS– Object, Classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Methods and Messages, Dynamic Binding.
- Features, Advantages and Applications of OOPS
- Aggregation and Association, Generalization, Multiple Inheritance.

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Advt. No. 04/2018: Syllabus for Post Code IT–2
Post: Technician(1)
Area: Information Technology

Introduction to Computers and Windows Operating System

History, Generations, Types, Applications of Computers. Concepts of Hardware and Software. Introduction to various processors. Introduction to the functions of an Operating System, Popular Operating Systems in Use. Main features of Windows O.S. Various Input/ Output devices in use and their features. Using Scanner, Printer and Webcam.

Computer Hardware basics and Software Installation

Introduction to the booting process, BIOS settings and their modification. Introduction to various types of memories and their features. Basic Hardware and software issues and their solutions. Formatting and Loading O.S and Application software and Antivirus.

Introduction to DOS Command Line Interface & Linux Operating System.

Introduction to basic DOS Internal and External Commands. Introduction to Open Source Software. Introduction to Linux Operating System features, structure, files and processes. Introduction to various Linux Shells. Basic Linux commands.

Word Processing

Introduction to the various applications in office. Introduction to Word features, Office button, toolbars. Creating, saving and formatting and printing documents using Word. Working with inserting objects, macro, mail merge, templates, Page setup and Printing Documents using word.

Spread Sheet Application

Introduction to Excel features and Data Types. Cell referencing. Use of functions of various categories, linking Sheets. Introduction to various functions in all categories of Excel. Concepts of Sorting, Filtering and Validating Data. Analyzing data using charts, data tables, pivot tables, goal seek and scenarios. Introduction to Reporting.

Image editing, Creating presentations & Using Open Office

Introduction to Open Office. Introduction to the properties and editing of images. Introduction to Power Point and its advantages. Creating Slide Shows. Fine tuning the presentation and good presentation techniques.

Database Management Systems

Concepts of Data, Information and Databases. Overview of popular databases, RDBMS, OODB and NOSQL. Rules for designing good tables. Integrity rules and constraints in a table. Relationships in tables. Introduction to various types of Queries and their uses. Designing Access Reports and Forms. Introduction to macros, designer objects controls, their properties and behaviour

Networking Concepts

Introduction to Computer Networks, Necessity and Advantages. Client Server and peer to Peer networking concepts. Concept of Proxy Server and proxy firewall server. Network topologies. Introduction to LAN, WAN and MAN. Network components, viz. Modem, Hub, Switch, Router, Bridge, Gateway etc. Network Cables, Wireless networks and Blue Tooth technology. Concept of ISO - OSI 7 Layer Model. Overview of various Network protocols Viz. TCP/IP, FTP, Telnet etc. Logical and Physical Addresses, Classes of Networks. Network Security &firewall concepts. Concept of DHCP Server

Internet Concepts

Introduction to WWW, Concept of Internet, Web Browsers, internet servers and search engines. Concepts of Domain naming Systems and E mail communication. Introduction to video chatting tools, VOIP and Social Networking concepts. Concept of Cloud storage and Open Web Server. Introduction to Internet Security, Threats and attacks, Malicious Software types, Internet security products and their advantages.

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Web Design Concepts

Concepts of Static and Dynamic Web pages. Introduction to HTML and various tags in HTML. Creating Forms with controls using HTML. Concepts of CSS and applying CSS to HTML. Introduction to open source CMS viz,. Joomla, Wordpress etc. and Web authoring tools viz. Kompozer, FrontPage etc.

Java Script

Algorithms and flowcharts. Introduction to Web Servers and their features. Introduction to Programming and Scripting Languages. Introduction to JavaScript and its application for the web. JavaScript Basics – Data types, Variables, Constants. Conversion between data types. The Arithmetic, Comparison, Logical and String Operators in JavaScript. Operator precedence. Arrays in JavaScript – concepts, types and usage. Program Control Statements and loops in JavaScript. Introduction to Functions in JavaScript. Built in JavaScript functions overview. The String data type in JavaScript. Introduction to String, Math and Date Functions. Concepts of Pop Up boxes in JavaScript. Introduction to the Document Object Model.

Introduction to VBA, Features and Applications.

Introduction to VBA features and applications. VBA Data types, Variables and Constants. Operators in VBA and operator precedence. Mathematical Expressions in VBA. Introduction to Strings in VBA. Introduction to Arrays in VBA. Conditional processing in VBA, using the IF, Else if, Select… Case Statements. Loops in VBA Introduction to VBA. VBA message boxes and input boxes. Introduction to Creating functions and Procedures in VBA. Using the built in functions. Creating and editing macros. Introduction to Object Oriented Programming Concepts. Concepts of Classes, Objects, Properties and Methods. Events and Event driven programming concepts. The user forms and control in Excel VBA. Properties, events and methods associated with the Button, Check Box, Label, ComboBox, Group Box, Option Button, List Box, Scroll Bar and Spin button controls. Overview of ActiveX Data objects. Debugging Techniques.

Smart Accounting

Basics of Accounting, Golden Rules of Accounting, Voucher Entry, Ledger Posting, Final Accounts Preparation. Cash Book. Ratio Analysis, Depreciation, Stock Management. Analysis of VAT, Cash Flow, Fund Flow Accounting. Introduction to Tally, features and Advantages. Implementing accounts in Tally. Double entry system of bookkeeping. Budgeting Systems, Scenario management and Variance Analysis. Costing Systems, Concepts of Ratios, Analysis of financial statements, Inventory Basics, POS Invoicing, TDS, TCS, FBT, VAT & Service Tax Processing in Tally. Tally Interface in Different Languages.

E Commerce

Definition of E commerce, Types, scope and benefits of E commerce. Difference between E commerce and traditional commerce. Capabilities requirements and Technology issues for E commerce. Types of E commerce web sites. Building business on the net. Concepts of on line Catalogues, Shopping carts, Checkout pages. Payment and Order Processing, Authorization, Chargeback and other payment methods. Security issues and payment gateways.

Cyber Security

Overview of Information Security, Security threats, information Security vulnerability and Risk management. Introduction to Directory Services, Access Control, Software Development Security, Privacy protection, Audit and Security. Introduction to I.T Act and penalties for cybercrimes.
