<u>**SYLLABUS FOR COMPUTER BASED RECRUITMENT TEST (CBRT)**</u>
<u>**FOR THE POST OF ASSISTANT PROFESSORS IN INFORMATION TECHNOLOGY**</u>
<u>**UNDER**</u>
<u>**GOA COLLEGE OF ENGINEERING**</u>
<u>**(ADVT. NO. 08 YEAR 2019)**</u>

I. General English including Grammar   **- 05 marks**

II. General Knowledge, Current Affairs and Events of National and **- 10 marks**
International Importance

III. Logical Reasoning and Analytical Ability   **- 10 marks**

IV. Core: - **50 marks**

Engineering Mathematics
Discrete Mathematics: Mathematical Logic, Sets and Relations, Counting, Mathematical Induction and Discrete Probability, Group Theory, Boolean Algebra, Combinatorics: counting, recurrence relations, generating functions, Propositional Logic, Algebraic Structures and Morphism, Graphs and Trees.
Calculus: Limits, continuity and differentiability, Maxima and minima, Mean value theorem, Integration.
Probability: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Logic Design
Number System and codes, Computer arithmetic (fixed and floating point), Boolean Algebra and Logic gates, Design and Analysis & implementation of Combinational Circuits and Sequential logic design.

Computer Organization and Architecture
Functional blocks of a computer, Data representation, Machine instructions and addressing modes, Instruction pipelining, x86 architecture, Memory system design: semiconductor memory technologies, Memory organization, Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes, Pipelining, Parallel Processors, Memory organization.

Programming, Data Structures, Design & Analysis of Algorithms
Programming in C. Object oriented Programming. Asymptotic worst-case time and space complexity. Performance measurements of Algorithm, Design techniques: Greedy, Brute-Force, Dynamic Programming, Branch and-Bound and Backtracking. .Linear and non linear data structures, Arrays, Stacks, Queue, Linked list and Tree, Graph, Recursion, ADT (Abstract Data type); Analysis, Tractable and Intractable Problems, Binary search trees, Binary heaps, Graph and Tree Algorithms, Algorithm dynamic programming and divide-and-conquer, Sorting, Searching, Hashing.

Formal Language & Automata Theory
Alphabet, Languages and grammars, Productions and derivation, Chomsky hierarchy of languages, Regular expressions and finite automata, Context-free grammars and pushdown automata, Context-sensitive languages, Regular and contex-free languages, Pumping lemma. Turing machines and undecidability.

Compiler Design
Lexical analysis, Syntax analysis, Semantic Analysis, Syntax-directed translation, Run-time Environment, Intermediate Code Generation, Code Improvement, Runtime environments, Intermediate code generation. Type systems.

System Software and Operating System

System Software: Machine, Assembly and High-Level Languages, Compilers and Interpreters, Loading, Linking and Relocation, Macros, Debuggers. Basics of Operating Systems: Operating System Structure, Operations and Services, System Calls. Operating System Design and Implementation, System Boot, Processes, Threads, Process Scheduling, Inter-process communication, Concurrency and synchronization. Deadlock, CPU scheduling, Memory management and virtual memory, I/O Hardware, File Management, Disk Management.

Database Management Systems

Database system architecture, Data models: network model, relational and object oriented data models, Integrity constraints, Data manipulation operations, Relational query languages: Relational algebra, Tuple and Domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server, Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. Storage strategies: Indices, B-trees, hashing. Transactions and concurrency control, Database Security, Object oriented and object relational databases, Distributed databases, Data warehousing and Data mining.

Software Engineering and Design

Software Process Models, Software Requirements, Object oriented design using UML, Software Design, Software Quality, Estimation and Scheduling of Software Projects, Software Testing, Software Configuration Management.

Artificial Intelligence

Approaches to AI, Search-Heuristic, Knowledge Representation and Reasoning, Uncertainty, Learning, Planning, Natural Language Processing, Fuzzy Sets.

Computer Networks

Data communication Components. Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, Techniques for Bandwidth utilization, Concept of layering: Data Link Layer and Medium Access Sub Layer Flow and error control techniques. Network Layer: switching, IPv4/IPv6, routers and routing algorithms (distance vector, link state). Transport Layer: Process to Process Communication, TCP/UDP and sockets, congestion control. Application layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography. Basics of Wi-Fi.

Advanced Areas

Neural Networks and Deep Learning, Machine learning, Web Technologies and Internet, Information Theory and coding, Internet-of-Things, Data Analytics, Cloud Computing, Computer Cryptography & Network Security.

Note:

Duration for C.B.R.T :   **75 Minutes**

Maximum Marks for C.B.R.T : 75 Marks