SYLLABUS FOR THE WRITTEN EXAM TOWARDS TEACH FOR GOA-FELLOW POSITION PUBLISHED VIDE ADVERTISEMENT NO.2024/01 & 2024/02 DATED 08/02/2024

General English including Grammar

Logical Reasoning and Analytical Ability

CORE

a. 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

b. Basic Electronics

Regulators, Filters, Transistors, Logic families and Memories

c. Computer Organization and Architecture

Functional blocks of a computer, Data representation, Machine instructions and addressing modes, Instruction pipelining, x86 architecture, Memory organization, Peripheral devices and their characteristics, Input-output subsystems, I/O device interface, I/O transfers, software interrupts, Programs and processes, Pipelining, Parallel Processors, Memory organization.

d. Data Structures

Linear and non linear data structures, Arrays, Stacks, Queue, Linked list and Tree, Graph, Recursion, Binary search trees, Binary heaps, Graph and Tree Algorithms, Sorting, Searching, Hashing.

e. Design & Analysis of Algorithms

Asymptotic worst-case time and space complexity. Performance measurements of Algorithm, Design techniques: Greedy, Brute-Force, Dynamic Programming, Branch and-Bound and Backtracking.

f. Compiler Design

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

g. System Software and Operating System

i. System Software: Machine, Assembly and High-Level Languages, Compilers and Interpreters, Loading, Linking and Relocation, Macros, Debuggers.

ii. 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.

h. Database Management Systems

Database system architecture, Data models, Integrity constraints, Relational algebra, Database Design & ER modeling, Normal forms, Structured Query Language (SQL), Transactions and concurrency control, Database Security, Distributed databases.

i. 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. Block based Programming like Scratch and Text-based programming like C & Python

j. Computer Networks

Data communication, Classification of computer networks, Switching techniques, Network Topologies, OSI Model, TCP/IP Suite, Data link protocols

k. Advanced Areas

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