SYLLABUS FOR PROGRAMMER EXAMINATION UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT-2018

General English Paper - I (3 hours duration)

ESSAY TYPE

(Full Marks : 100)

(a) Essay Writing (Conventional)..... 20 Marks

(b) Idioms & Phrases (MCQ) ..... 16 Marks

(c) Comprehension of given passages (MCQ) ..... 16 Marks

(d) Grammar (MCQ) ..... 16 Marks
Parts of Speech : Nouns, Adjective, Verb, Adverb, Preposition, etc.

(e) Composition (MCQ) ..... 16 Marks

i) Analysis of complex and compound sentences

ii) Transformation of sentences

iii) Synthesis of sentences

(f) Correct usage and vocabularies (MCQ) ..... 16 Marks

General English Paper - II (2 hours duration)

OBJECTIVE TYPE (MCQ)

(Full Marks : 100)

(a) Grammar : ..... 40 Marks
Parts of Speech, Nouns, Adjective, Verb, Adverb, Preposition, etc.

(b) Composition ....30 Marks

i) Analysis of complex and compound sentences

ii) Transformation of sentences

iii) Synthesis of sentences

(c) Correct usage and vocabularies ..... 30 Marks

TECHNICAL PAPER – I (200 Marks)

Data Structure &Algorithm : (70 Marks)

Array, linked list, Stack, Queue, tree traversal techniques, Binary Tree - Huffmann Coding, Prefix, Infix and Postfix notations, Graph search – Depth First Search, Breadth First Search, binary search tree. Single Source Shortest Path Algorithms. Minimum Spanning Tree. Sorting Schemes – Bubble, Insertion, Selection, Quicksort, Heapsort. Analysis of algorithms – Best case, worst case, average case. Running time of algorithm – Big Oh, Omega, theta notation; Greedy algorithms; Divide & Conquer; Dynamic Programming.

Computer Architecture & Organization : (60 Marks)

Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Half-adder, Full-adder. Integrated Circuits, Decoders, Multiplexers, Registers. Memory Unit-RAM, ROM, Types of ROMs. Basic Computer Organization and design: Instruction Codes, Computer Registers, Computer Instructions, Timing & Control, Instruction Cycle, Memory-Reference Instructions, Concept of Interrupt. Floating Point Number Representation, Addition, Subtraction, Multiplication and Division of Numbers in different types of Representation. BCD Representation; Modes of I/O transfer, types of I/O, Virtual Memory System; Pipeline, Parallel processing; Arithmetic and instruction Pipelining.

Operating System : (70 Marks)

Operating System Concepts (Multitasking, multiprogramming, multi user, Multithreading). Type of Operating Systems. Process concept, state transition diagram, PCB, Process scheduling, scheduling algorithms. Inter Process Communication, Mutual exclusion, Critical Section Problems, semaphores. Deadlock, methods for handling deadlocks-deadlock prevention, avoidance & detection; deadlock recovery. Need of Memory management and its requirements, paging, segmentation, concept of fragmentation. Characteristics of contiguous & non-contiguous allocation techniques, fragmentation, Virtual memory management, page-replacement. Concept of FIFO and optimal page-replacement algorithms, Concept of LRU, LFU and its page-replacement algorithm, Concept of allocation algorithms. Segmentation: Best fit, first fit & worst fit. File concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance. I/O hardware, polling, interrupts, DMA, application I/O interface.

TECHNICAL PAPER – II (200 Marks)

Object Oriented Programming : (70 marks)

Classes and Objects, Inline functions, memory allocation and deallocation (new and delete), Static data member and member function, constructor and destructor, operator overloading, Inheritance and its types, friend and Virtual Functions. Pointers to objects, pure virtual functions. Managing I/O operations, I/O streams, File handling, File handling with OOP, Error handling in file operations, random file access, Exception handling methods, throwing mechanism, catching mechanism, strings characteristics and uses. Class template with multiple parameters, Function template, function template with multiple parameters, overloading of template functions

Database Management System : (70 Marks)

Data models, schemas and instances, DBMS architecture, ER model, Extended ER model, constraints, relational algebra. Relational calculus, tuple and Domain calculus, DDL data definitions queries and updates in SQL, DML. Functional Dependencies: Normal forms, First, Second and Third functional normal forms, BCNF, multi-valued dependencies Fourth normal form, Join dependencies and fifth normal form. Transaction Processing Concepts, Transaction and System Concepts, schedules and Recoverability, serializability of schedules. Concurrency Control Techniques: Locking techniques for concurrency control, Time Stamping and concurrency control.

Software Engineering : (60 Marks)

Program and Software, Software Development Life-cycle, Requirements analysis and specifications techniques, software design, coding, testing, maintenance. Organizational structure planning, project formats and team structures; Planning for quality assurance and configuration management; Cost estimation and evaluation techniques. System analysis flow Oriented and class oriented modelling using data modelling concept. Software design approaches, design specification. Structured coding techniques, coding styles, and standards; Guidelines for coding and documentation. Black box and white box testing, Integration and system testing. Software reliability: Definition and concept of reliability, software faults, errors, repair and availability, reliability and availability models.

TECHNICAL PAPER – III (200 Marks)

Computer Networks : (90 Marks)

Network topology, criteria for measuring network performance, types of network: LAN, MAN, WAN. OSI model, TCP/IP model, IP address. Transmission media: Optical fiber, coaxial and UTP cable, unguided media: types of signal propagation in unguided media, different types of encoding signal. Networking devices. Error detection and correction-error, flow control, line discipline. Multiple access protocols, Collision free protocols. Multiplexing and demultiplexing. Circuit switching & packet switching. Distance Vector Routing, Link State Routing, Broadcast Routing, Multicast Routing. The leaky bucket algorithm, token bucket algorithm. Congestion control in virtual circuits, load shedding, jitter control, congestion control for multicasting. Transport layer services, elements of transport protocols, TCP-service model, protocol, segment header, connection management, transmission policy, timer management. UDP. Network Management and security.

Web Technology : (60 Marks)

Client/Server Computing, Middleware, Fat client VS Fat Servers, N-tiered Software Architecture. SGML, DTD Resource, HTML, CSS, XML. Web Server architecture: Web Server Architecture, Server Features, Configuration of Apache and IIS. Protocols: HTTP, FTP, SMTP, POP; JAVA SCRIPT, JAVA Applet: Graphics Programming, Input / Output Files in Java, concepts of Streams, Stream Classes, Byte Stream classes, Character stream classes, I/O Classes, File Class, I/O exceptions, Creation of files: Reading / Writing characters, Byte-Handling. JAVA Servlet. ASP & JSP Search Engines, Remote Method Invocations; Web Database Connectivity; CGI interface to Database, JDBC interface to Database. Web Security: S-HTTP, Fire Walls, Proxy Servers. Distributed Object Models: CORBA, DCOM, EJB.

Aptitude : (50 Mark)

(a) Numerical And Figurework Tests: (16 Marks)

These tests are reflections of fluency with numbers and calculations. It shows how easily a person can think with numbers. The subject will be given a series of numbers. His/Her task is to see how the numbers go together to form a relationship with each other. He/She has to choose a number which would go next in the series.

(b) Verbal Analysis And Vocabulary Tests: (14 Marks)

These tests measure the degree of comfort and fluency with the English language. These tests will measure how a person will reason with words. The subject will be

given questions with alternative answers, that will reflect his/her command of the rule and use of English language.

(c) Visual And Spatial/3-D Ability Tests: (10 Marks)

These tests are used to measure perceptual speed and acuity. The subject will be shown pictures where he/she is asked to identify the odd one out; or which comes next in the sequence or explores how easily he/she can see and turn around objects in space.

(d) Abstract Reasoning Tests: (10 Marks)

This test measures the ability to analyse information and solve problems on a complex, thought based level. It measures a person's ability to quickly identify patterns, logical rules and trends in new data, integrate this information, and apply it to solve problems.