FURTHER DETAILS REGARDING MAIN TOPICS OF PROGRAMME NO. 04(A)/2013 (Item No. 2)
P R O G R A M M E R
KERALA STATE PLANNING BOARD
(CATEGORY NO. 441/2009)

PART. I   -   MATHEMATICS

1. REAL ANALYSIS

Real numbers - Rational numbers - finite and infinite sets - countable and uncountable sets -open and closed sets - limit points sequence and series of real numbers convergence of sequence and series of real numbers - limits of sequence and series - continuous functions - compactness -Riemann integrals - beta and gamma functions — cantor set

2. ALGEBRA

Integers - divisibility - prime numbers - congruence - Fermat's theorem - Euler's theorem -Matrices - rank of a matrix - characteristic values and characteristic vectors - symmetric , skew symmetric , Hermition , skew Hermition , and orthogonal matrices - Roots of polynomials – Cardan's solution of cubic equation - Ferrari's solution of biquadratic equation - Descartes' rule of signs

3. MODERN ALGEBRA

Binary compositions - Groups - Rings - Integral domains - Fields - Vector spaces - Basis of finite dimensional vector spaces - Dimension of a vector space - linear transformations- definition of Boolean Algebra

4. CALCULUS

Functions and graphs - algebraic ,trigonometric and exponential limits - derivability and derivative - concavity and points of inflection - curvature - asymptotes - Hyperbolic Functions - Mean value theorems - higher derivatives -Partial derivatives - Applications of Integration - Differential equations

5. COMPLEX ANALYSIS

Complex Numbers - Polar form - Analytic Functions - Power series - Zeroes of an analytic Function - Residues and contour integration

PART. II - STATISTICS

1. ## BASICS OF DATA COLLECTION:

Collection of data-Methods of data collection-Primary and Secondary data—Classification and Tabulation—Frequency distribution— Diagrammatic and Graphic presentation of data — Ogives.

2. ## DESCRIPTIVE STATISTICS:

Measures of central values (AM,GM,HM, Median, Mode)-Measures of variations (QD, MD, SD, coefficient of variation)- partition values- skewness and kurtosis.

3. ## CORRELATION AND REGRESSION:

Pearson's correlation coefficient and rank correlation coefficient - coefficient of determination- Regression — simple linear regression, the two regression lines, regression coefficients and their properties.

4. ## PROBABILITY THEORY:

Definitions of probability- Addition and multiplication theorem - Conditional probability- Bayes' Theorem.

5. ## RANDOM VARIABLE AND PROBABILITY DISTRIBUTION:

Probability density function and cumulative distribution- marginal and conditional distributions, independence of random variables- Expectation of a random variable, moments, moment generating function.

6. ## STANDARD DISTRIBUTIONS:

Bernoulli, Binomial, Poisson — Geometric- Uniform-Normal distributions.

7. ## SAMPLING THEORY:-

Population and sample— advantages of sampling over census —Random Sampling and non-random sampling- methods of drawing random samples from a finite population (SRS, Systematic, Stratified, Multistage and Cluster sampling)- sampling error and non-sampling error.

8. SAMPLING DISTRIBUTIONS:

Sampling from a normal population, sampling distributions of the sample mean and variance. Chi-square, student's t and F distributions

9. ESTIMATION THEORY:

Parameter and Statistic- Point estimation, unbiased ness, consistency, sufficiency, Fisher Neyman factorization criterion, efficiency. - Methods of estimation, method of moments, method of maximum likelihood Interval estimates of mean, difference of means, variance.

1O. TESTING OF HYPOTHESIS:

Simple and composite hypotheses, null and alternative hypotheses, type I and, type II errors, critical region, level of significance and power of a test Neymann-Pearson approach-Large sample tests concerning mean, equality of means. Small sample tests based on **t** distribution for mean, equality of means and paired t-test for paired data. Tests based on F distribution for ratio of variances. Test based on chi square-distribution for variance, goodness of fit and for independence of attributes. One-way ANOVA.

PART. III - COMPUTER PROGRAMMING

1. BASIC SCIENCES & MATHEMATICS

Binomial series - coordinate geometry - differential equations - eigen values & eigen vectors - relations & functions - graph connectedness - planarity - Hamiltonian / Eulerian graph.
Operations Research - linear programming - game theory.

2. HARDWARE & MICROPROCESSORS

Passive components - Semiconductors - Transistors.
Number systems - logic families - sequential circuits - flip-flops - counters - RAM and ROM.
8085 microprocessor - direct memory access - 8051 microcontroller and applications -
8051 programming - 8251, 8253, 8255, 8257, 8259 and 8279 chips - 8086 microprocessor.

3. DATA STRUCTURES, OBJECT ORIENTED CONCEPTS & PROGRAMMING

C Programming - pointers - doubly linked lists - dynamic memory allocation - stack, queue, double-ended queue, tree, graph operations - in-order, pre-order, post-order traversals - binary search tree - DFS, BFS - shortest path algorithm - bubble sort, insertion sort, quicksort, heapsort, merge sort - linear search - binary search - object-oriented programming concepts - C++ programming - multiple inheritance - files and streams - Java programming - exception handling - multithreading - applets -servlets.

4. SYSTEM SOFTWARE, DBMS & SOFTWARE ENGINEERING

Data-models- relational model -functional dependency- normalization - SQL. - Assembler - macro - linker - loader - compiler - lexical analyser - syntax analyser -storage assignment - code generation.
Operating Systems - CPU scheduling - synchronization - deadlock - address binding -memory allocation methods - page replacement - virtual memory - file systems - disk scheduling.
Software life cycle models - SRS - principles of software design - project management - cost estimation.

5. COMPUTER NETWORKS & WEB TECHNOLOGIES

Data communication - network topologies - LAN, MAN, WAN – ISO/OSI model -manchester encoding - ASK, FSK, PSK - Quadrature Amplitude Modulation - transmission media - multiplexing - IEEE 802 standards. -
Data link layer protocols - CSMA - point-to-point protocol - ATM - bridge - router -distance vector routing - link state routing - TCPIIP - UDP - DHCP - domain name service - FTP, TFTP, telnet, SMTP, POP, SNMP, HTTP - mobile computing – wireless LAN - bluetooth.
Socket programming - remote method invocation - proxy server – internet security -firewall - IIS and Apache server - HTML - XML - style sheet - javascript - PHP – web design - flash - dreamweaver - web hosting.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.