

Examination: B.A/B.Sc.

Paper: Mathematics (B. Course) - II

Maximum Marks: 100

Time Allowed: 3 Hrs.

Note: attempt any Five questions by selecting at least One from each section

Q.1(a) Using Regula Falsi method find the real root of the equation $x \log_{10} x = 1.2$

(b) Use the method of iteration to find the root of the equation $e^{-x} = 10x$

(c) Calculate the real root of convergence of Secant method

Q.2 (a) Set up Newton's scheme of iteration for finding the pth root of positive number N

(b) A function $y = f(x)$ is given by following table

x	0.0	0.2	0.4	0.6	0.8	1.0
y	0.0000	0.0456	0.1278	0.3494	0.4027	0.4825

Evaluate $f'(0.85)$ and $f''(0.85)$

(c) Prove that $\mu\delta = \Delta(1 + \frac{\Delta}{2})(1 + \Delta)^{-1}$

Q.3 (a) Evaluate $\int_0^{\pi} \sin x \, dx$ by Simpson's rule dividing the range of integration into six equal parts

(b) Compute the integral by trapezoidal rule $I = \int_0^1 e^{-x^2} \, dx$ with $h=0.125$

(c) Solve the system of equation by Gauss-Seidel method

$$20x + y - 2z = 17, \quad 3x + 20y - z = -18, \quad 2x - 3y + 20z = 25$$

Section - II

Q.4 (a) Maximize $z = 2x_1 + x_2$

Subject to $5x_1 + 2x_2 \leq 200, \quad 5x_1 + 3x_2 \leq 255, \quad x_1, x_2 \geq 0$

First convert the primal problem into dual and then solve by graphical method

(b) Compare the starting solutions obtained by North west corner and least cost method

0	2	1	6
2	1	5	7
2	4	3	7
5	5	10	

Q.5 (a) Maximize $Z = 2x + y$

Subject to $x + y \leq 2, \quad x + y \leq 6, \quad x + 2y \leq 9, \quad x, y \geq 0$

Solve by Simplex method

(b) Find associated cost by VAM Method

	10	5	7	8	Supply
6		4	8	5	1250
9		12	10	7	2250
Demand	1100	800	1900	1200	

Section III

Q.6 (a) Find the solution set of the equation $45x + 63y = 450$

(b) Show that if both 'x' and 'y' are odd then there does not exist integer 'z' such that $x^2 + y^2 = z^2$

(c) Find the remainder when 7^{23} is divide by 8

Q.7 (a) Prove that $\text{Int}(A)$ is an open set

(b) Prove that every open sphere in a metric space X is an open

(c) Let A and B are the subsets of a topological space X then show that $\text{Int}(A) = \text{Ext}(A')$

Q.8 (a) Prove that the product of any three consecutive integers is divisible by 6

(b) Prove that $\Delta - \nabla = \Delta \nabla$ where Δ and ∇ are forward and backward difference operators

(c) If 'P' is a prime such that $P/a^2 + b^2$ and P/a then prove that P/b

(d) Write two advantages and disadvantages of Bisection method

(e) Define closure of a set with its example.