

University of Sargodha

B.A/B.Sc Ist Annual Examination 2007

Applied Mathematics

Paper- A



Time Allowed: 3 Hours

Maximum Marks: 100

Note: Attempt six questions in all, selecting two questions from each section.

Section- I

- Q.1. (a) Solve the differential equation. $(2x + y + 1)dx + (4x + 2y - 1)dy = 0$ (9.3) Example 15 (9) CH=9
(b) Solve the differential equation. $xy^2 + (y - 1 - x^2)p - x(y - 1) = 0$ Q.7 9.8 method
- Q.2. (a) Solve the initial value problem. $(x^2 + 1)\frac{dy}{dx} + 4xy = x, y(2) = 1$ Q.16 EX: 96 method
(b) A newly built fish farm is stocked with 400 fish at time $t = 0$ (month), thereafter the population increases at the rate of \sqrt{p} per month, when there are p fish in the farm, what is the fish population at time 't'? (8) Q.6 10.11 method
- Q.3. (a) Solve the differential equation. $(3y + 4xy^2)dx + (2x + 3x^2y)dy = 0$ Q.9 EX: 9.5
(b) Solve by method of U.C. $y'' - 3y' + 2y = 2x^2 + 2xe^x$ Q.6 EX: 10.3 (8) method
- Q.4. (a) Find a particular solution of following. $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = \frac{e^{2x}}{1+x}$ Q.5 EX: 10.9
(b) Apply the Power Series Method to solve the differential equation. $x(1-x)y' = y$ Q: 9 EX: 10.9

Section- II

- Q.5. (a) Compute the inverse Laplace Transformation of the following. $\frac{s^3 + 3s^2 - s - 3}{(s^2 + 2s + 5)^2}$ Q.13 EX: 11.2
(b) Find a positive root of a non linear equation, using Bisection Method. (8) (Numerical Any.)
 $f(x) = x^3 - x^2 - 2x + 1.$
- Q.6. (a) Use the Laplace Transformation Method to solve the following initial value Problem. $\frac{d^2y}{dt^2} - 2\frac{dy}{dt} = 20e^{-t} \cot t, y(0) = 0 = y'(0)$ Q.9 EX: 11.3
(b) Find the positive root of the equation. $x^3 + x^2 - x - 3 = 0$ Using (8) Numerical Any.
- Q.7. (a) Find the positive root of the equation. $e^x = 2x + 21$ by using Newton's (8) Raphson Method with $x_1 = 3$ Numerical Any.

P.T.O

Set. 2 Q. 1-4 = 2
Set. 1 Q. 5-8 = 2
Set. 1 Q. 9-11 = 1
6

65

86
2

CH=9
CH:10
2.16.10.7
2Q Attempt

(66)

$$3 \times \frac{3}{4} + \frac{3}{4} = \frac{12}{4} = 3$$

86

(b) Prove that

$$\Delta \left(\frac{f_n}{g_n} \right) = \frac{g_n \Delta f_n - f_n \Delta g_n}{g_n g_{n+1}}$$

Numerical
Any:Q.8. (a) Find the first three derivatives of $f(x)$ from the following table at $x = 1.9$

x	1.0	1.2	1.4	1.6	1.8	2.0
$f(x)$	0	0.128	0.544	0.296	2.432	4.00

Numerical
Any

(b) Use the Simpson's Rule to approximate the given integral.

$$\int_2^3 \frac{\sin x}{x} dx \quad \text{with } n = 6$$

EX: 5.5
Calculator.Section- IIIQ.9. (a) Find the maximum value of $z = 9x_1 + x_2$ subject to the Constraints.

$$\begin{aligned} 2x_1 + x_2 &\leq 8 \\ 4x_1 + 3x_2 &\leq 14 \\ x_1, x_2 &\geq 0 \end{aligned}$$

Graphs

(b) Minimize
such that

$$z = x_2 - x_1$$

$$\begin{aligned} -x_1 + 2x_2 &\leq 2 \\ x_1 + x_2 &\leq 4 \\ x_1, x_2 &\geq 3 \end{aligned}$$

 $x_1, x_2 \geq 0$ Using simplex method.Q.10. (a) If A and B are any two events defined in a sample space S , then

$$P(A \cap \bar{B}) = P(A) - P(A \cap B)$$

(b) An integer is chosen at random from the first 200 positive integers. What is the probability that the integer chosen is divisible by 6 or by 8?

Probability

Q.11. (a) If A and B are two independent events in a sample space S , then show thati. A and \bar{B} are independent. ii. \bar{A} and \bar{B} are independent.(b) An event has the probability $p = \frac{3}{8}$. Find the complete Binomial Distribution for $n = 5$ trials.

Q.12. (a) A man draw two balls from a bag containing 3 white and 5 black balls. If he receives Rs.70 for every white ball he draws and Rs.7 for every black ball, find his expectation.

(b) Write down the properties of Binomial Distribution.

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$$\begin{aligned} \frac{4}{7} &= \frac{1}{2} \\ (3) \frac{1}{2} &= \frac{1}{2} \\ n(2-4) &= 11-12 \\ n &= \frac{12}{2} \\ 1 &= \frac{12}{2} \\ &= 6 \\ \frac{1}{n} &= \frac{1}{6} \end{aligned}$$