

University of Sargodha

B.A/B. Sc 1st Annual Exam 2013.

Subject: Applied Math Paper: A



Maximum Marks: 100

Time Allowed: 3 Hours

Note: Attempt any two questions from each section.

Section- I

- Q.1. a. Solve the initial value problem $\frac{dy}{dx} = \frac{2x}{y+x^2y}$, $y(0) = -2$ (8)
 b. Solve $(x - y)dx + (x + y)dy = 0$ (9)
- Q.2. a. Solve the differential equation $(3x^2y + 2)dx + (x^3 + y)dy = 0$ (8)
 b. Solve the equation $\frac{dy}{dx} + \frac{xy}{1-x^2} = xy^{\frac{1}{2}}$ (9)
- Q.3. a. Find the orthogonal trajectories of the family of cardioids $r = a(1 + \cos\theta)$ (8)
 b. Solve $(D^2 - 5D + 6)Y = \sin 3x$ (9)
- Q.4. a. Find the general solution of $(D^2 + 3D - 4)Y = 15e^x$ (8)
 b. Solve by the method of U.C $y'' - 3y' + 2y = x^2e^x$ (9)

Section- II

- Q.5. a. Compute the Laplace transformation of e^{at} where a is a constant and $s \neq a$. (8)
 b. Find the inverse Laplace transformation of $\frac{3s+17}{s^2+8s+25}$ (8)
- Q.6. a. Solve the equation $f(x) = e^x - 3x = 0$ by bisection method. (8)
 b. Using Newton Raphson method, evaluate to two decimal places the root of the equation which lies between 0 and 1, the function is $f(x) = e^x - 3x = 0$ (8)
- Q.7. a. Evaluate $\int_1^3 \frac{1}{x^2} dx$ by using trapezoidal rule for five points. (8)
 b. Apply 5 points Simpson's rule to evaluate $\int_0^1 \frac{1}{1+x^2} dx$ (8)
- Q.8. a. Find first and second derivatives of the function from the following data at $x = 2$. (8)
- | | | | | | |
|------|---|----|----|----|-----|
| x | 1 | 2 | 3 | 4 | 5 |
| f(x) | 3 | 10 | 29 | 66 | 127 |
- b. Evaluate the integral $\int_0^1 \frac{1}{1+x^2} dx$ by using rectangular rule for $n = 4$. (8)

Section- III

- Q.9. a. Maximize $z = 10x_1 + 11x_2$ subject to the conditions $3x_1 + 4x_2 \leq 9$, $5x_1 + 2x_2 \leq 8$, $x_1 - 2x_2 \leq 1$ where $x_1, x_2 \geq 0$ (8)
 b. Use Simplex method to find the maximum value of object function $z = 3x_1 + 2x_2$ with the condition $x_1 + 2x_2 \leq 6$, $2x_1 + x_2 \leq 8$, $-x_1 + x_2 \leq 1$, $x_2 \leq 2$ where $x_1, x_2 \geq 0$ (9)
- Q.10. a. 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? (8)
 b. A card is drawn at random from a deck of ordinary playing cards. What is the probability that it is a diamond, a face card or a king. (9)
- Q.11. a. A man tosses two fair dice. What is the conditional probability that the sum of the two dice will be 7, given that:
 i. the sum is odd ii. the sum is greater than 6 iii. the two dice had same outcome. (8)
 b. A pair of fair dice is thrown twice. What is the probability of getting totals of 5 and 11? (9)
- Q.12. a. A certain event is believed to follow the binomial distribution. In 1024 samples of 5, the result was observed once 405 times and twice 270 times. Find p and q . (8)
 b. An event has the probability $P = \frac{3}{8}$. Find the complete binomial distribution for $n = 5$ trials. (9)