



SP-1858

Seat No. _____

B. C. A. (Sem. II) Examination

April/May - 2006

Fundamentals in Mathematics & Statistics

(New Course)

Time : **3 Hours**]

[Total Marks : **100**

1 (a) Answer any two : 8

(1) Explain the following terms :

Matrix, Squares matrix, Unit matrix, Scaler Matrix.

(2) Obtain a square matrix **X** of order 2×2 which satisfies the matrix equation **AX = BC**.

If $A = \begin{pmatrix} 2 & 1 \\ 0 & -3 \end{pmatrix}$ $B = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$ $C = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$

(3) Find Inverse of the following matrix :

$$\begin{pmatrix} 1 & 1 \\ -1 & 1 \\ 1 & -1 \end{pmatrix}$$

(b) Answer any two : 7

(1) Find the solution using Gauss eliminating method :

$$\begin{aligned} 3x + y - z &= 3 \\ 2x - 8y + z &= -5 \\ x - 2y + 9z &= 8 \end{aligned}$$

(2) Solve the following equation by Gauss Jordan method :

$$\begin{aligned} 3x + 4y - z &= 8 \\ -2x + y + z &= 3 \\ x + 2y - z &= 2 \end{aligned}$$

(c) Evaluate $\int_0^{10} \frac{1}{1+x^2} dx$ ($h=1$). 5

2 (a) Answer any **two** : 10

- (1) Explain Newton's forward difference formulas.
- (2) The area A of a circle of diameter d is given for the following values :

d :	80	85	90	95	100
A :	5026	5674	6362	7088	7854

Calculate the area of circle of diameter 105.

- (3) Find 10933. If $10920 = 1.3010$, $10930 = 1.4771$ and $10938 = 1.5798$.

(b) Answer any **two** : 10

- (1) Explain False position method.
- (2) Find a root of the equation $x^3 - x - 11 = 0$ correct to four decimal using bisection method.
- (3) Using N-R method, find a root correct to three decimal places :

$$f(x) = xe^x - \cos x$$

3 (a) Answer any **three** : 15

- (1) Apply Euler's method to solve

$$\frac{dy}{dx} = x + y, \quad y(0) = 0 \quad \text{take } h = 0.2$$

(Carry out 5 steps)

- (2) Using R-K 4th order. Solve

$$\frac{dy}{dx} = y^2 + xy, \quad y(0) = 1 \quad \text{and find } y(0.1), y(0.2).$$

- (3) Obtain formula for R-K 2nd order method.

(b) Find median from the following distribution : 5

$Class$:	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50
$Frequency$:	7	15	24	31	42	30	26	15	10

4 (a) Answer any **two** : 10

- (1) Calculate the lower and upper quartile from the following data :

Class :	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
Frequency :	7	18	25	30	20

- (2) Calculate mean and standard deviation of the following frequency distribution of marks :

Marks :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency :	5	12	30	45	50	37	21

- (3) You are given the following data :

	X	Y
Mean	36	85
S.D.	11	8

Correlation coefficient is 0.66.

Find :

- (1) Two regression line
(2) Estimate the value of x when $y = 75$.

(b) Answer any **two** : 10

- (1) Write properties of correlation and regression.
(2) Obtain two regression coefficients from the data given below :

x :	50	60	50	60	80	50	80	40	70
y :	30	60	40	50	60	30	70	50	60

- (3) The coefficient of rank correlation of the marks obtained by 10 students in two subject is 0.8, It was later discovered that the difference in ranks in the two subjects obtained by one student was wrongly taken as 7 instead of 9. Find correct value of rank correlation.

5 Answer any four : 20

(1) Draw a frequency polygon from the following data :

Salary :	300 – 400	400 – 500	500 – 600	600 – 700	700 – 800	800 – 900	900 – 1000	1000 – 1100
No. of Employees :	20	30	60	75	45	100	60	40

(2) A salesman is known to sell a product in 3 out of 5 attempts while another salesman in 2 out 5 attempts. Find the probability that (i) no sale will be affected when both try to sell the product and (ii) either of them will succeed in selling the product.

(3) State and prove additional law of probability.

(4) Find mean of variance of random variable **X** is :

X :	3	4	5	6
p(x) :	0.2	0.4	0.3	0.1

(5) A player loses 3 fair coins. He wins Rs. 5 if 3 heads appear, Rs. 3 if 2 heads appear, Re. 1 if 1 head appears on the other hand he loses Rs. 20 if 3 tails appear. Find expected gain of the player.
