



- Notes :
1. All questions carry equal marks.
 2. Use of Non – Programmable calculator is permitted.
 3. Use of Normal distribution table is permitted.

1. a) Use bisection method to find a positive root of the equation $\cos x - 1.3x = 0$ correct to four places of decimal. **8**

- b) Solve the system of equation by Crout's method **8**
- $$\begin{aligned} 2x + 4y - 2z &= 14 \\ x + 3y - 4z &= 16 \\ -x + 2y + 3z &= 1 \end{aligned}$$

OR

2. a) Find the real root of equation $2x - \log_{10} x = 7$, by method of Newton – Raphson correct upto four places of decimal. **8**

- b) Solve the system of equations by Gauss – Seidel iteration method. **8**
- $$\begin{aligned} 10x - 2y - z - u &= 3 \\ x - y + 10z - 2u &= 27 \\ -x - y - 2z + 10u &= -9 \\ -2x + 10y - z - u &= 15 \end{aligned}$$

3. a) Apply picard's method upto third approximation to solve. **8**
- $$\frac{dy}{dx} = 1 + x^3 y, y(0) = 3 \text{ and find. } y(0.1).$$

- b) Given $\frac{dy}{dx} = x - \frac{1}{10} y^2, y(0) = 1$ **8**

x	-0.1	0.1	0.2
y	1.0151	0.9951	1.0001

Use Milne's predictor – corrector method to find $y(0.3)$ and $y(0.4)$

OR

4. a) Use Range – Kutta method to Find an approximate value of y when $x = 0.2$ and 0.4 , given that $\frac{dy}{dx} = y - \frac{2x}{y}, y(0) = 1$. **8**

- b) Using Enler's modified method, solve the equators $\frac{dy}{dx} = x + \sqrt{y}$ given $y = 1$ when $x = 0$ for range $0 \leq x \leq 0.4$ taking $h = 0.2$ **8**

5. a) An urn hold 5 white and 3 Black marbles if two marbles are drawn at random without replacement and x denotes the number of white marbles find **8**
- i) The probability Function.
 - ii) Distribution Function.

- b) Find the coefficient of skewness and Kurtosis for the exponential distribution having density function. 8

$$f(x) = \begin{cases} \alpha e^{-\alpha x} & , \quad x \geq 0 \\ 0 & , \quad \text{otherwise} \end{cases}$$

OR

6. a) Find mathematical expectation of discrete Random variable x whose probability Function is $f(x) = (\frac{1}{2})^x$, $x = 1, 2, 3, \dots$ 8

- b) A random variable x has density function 8

$$f(x) = \begin{cases} cx^2 & 1 \leq x \leq 3 \\ cx & 3 < x < 4 \\ 0 & \text{otherwise} \end{cases}$$

Find i) Constant c

ii) $P(x > 2)$

iii) $P(\frac{1}{2} < x < \frac{3}{2})$

iv) Distribution Function

7. a) If the probability that an individual suffer a bad reaction from injection of a given serum is 0.001 determine the probability that out of 2000 individuals. 8

i) exactly 3 ii) at least 2 iii) at most 2
will suffer a bad reaction.

- b) A manufacture of envelops know that the weight of envelope is normally distributed with mean 1.9 gm and variance 0.01 gm. Find how many envelopes weighting
(i) 2 gm an more (ii) 2.1 gm an less can be expected in a given packet of 1000 envelopes. 8

OR

- 8 a) Two lines of regression are given by $5y - 8x + 17 = 0$ and $2y - 5x + 14 = 0$ of $\sigma_y^2 = 16$ find 8

(i) the mean values of x and y
(ii) the coefficient of correlation between x and y
(iii) σ_x^2

- b) Marks of twelve students in mathematics and statistics are given below. 8

Mathematics	60	34	40	50	45	40	22	43	42	66	64	46
Statistics	75	32	33	40	45	33	12	30	34	72	41	57

Calculate rank correlation coefficient.

9. a) Find $y(0.3)$ and $y'(0.3)$ from the following Table 8

x	0.2	0.4	0.6	0.8	1.0
y	25.04	6.41	3.138	2.202	2.0

- b) Solve $y_{n+3} - 5y_{n+2} + 3y_{n+1} + 9y_n = 2^n + 3^n$ 8

OR

10. a) Use Simpson's $1/3^{\text{rd}}$ rule to evaluate the integral $\int_0^2 \frac{2e^{-x^2}}{\sqrt{\pi}} dx$, taking 10 equal strips. 8

- b) Find the missing terms from the following data. 8

x	1	3	4	8	10
y	8	-	11	32	-
