



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199403

Roll No.

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B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15
MATHEMATICS - III

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions.

All questions carry equal marks.

1 Attempt any two parts of the following : 2×10=20

(a) Show that the function $f(z)$ defined by

$$f(z) = \frac{x^3 y^3 (x+iy)}{x^6 + y^{10}} \quad z \neq 0, f(0) = 0$$

is not analytic at the origin even though it satisfies Cauchy-Riemann equations at the origin.

(b) Verify Cauchy's theorem for the function $f(z) = 3z^2 + iz - 4$ along the perimeter of the square with vertices $1 \pm i, -1 \pm i$.

(c) Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5 + 4 \cos \theta} d\theta$

- 2 Attempt any two parts of the following : **2×10=20**

- (a) Find the first four moments for the following frequency distribution about the mean

x	0	1	2	3	4	5	6	7
f	1	8	28	56	70	56	28	8

- (b) Fit a parabola of the form $y = a+bx+cx^2$ to the data.

x	1	2	3	4	5
y	25	28	33	39	46

- (c) The lines of regression are given by $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ and

$$\sigma_x^2 = 12, \text{ calculate :}$$

- (i) the mean values of x and y
- (ii) variance of y
- (iii) the coefficient of correlation between x and y.

- 3 Attempt any two parts of the following : **2×10=20**

- (a) Out of 800 families with four children each, how many families would be expected to have

- (i) 2 boys and 2 girls
- (ii) at least one boy
- (iii) no girl
- (iv) at most two girls ?

Assume equal probabilities for boys and girls.

- (b) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
- (c) To test the effectiveness of inoculation against cholera, the following table was obtained :

	Attacked	Not Attacked	Total
Inoculated	30	160	190
Not inoculated	140	460	600
Total	170	620	790

Use χ^2 -test to defend or refute the statement that the inoculation prevent attack from cholera.

- 4 Attempt any two parts of the following : **2×10=20**

- (a) Explain Newton - Raphson method for computing roots. Hence find the root of the equation $x \log_{10} x = 4.77$ correct to five decimal places by this method.

- (b) Using Lagrange's interpolation formula, find a cubic polynomial which approximates the following data :

x:	-2	-1	2	3
f(x):	-12	-8	3	5

- (c) Use Newton's formula to compute y at $x = 24$ and $x = 35$ from the following data :

x	21	25	29	33	37
y	18.4	17.8	17.1	16.3	15.5

- 5 Attempt any two parts of the following : **2×10=20**

- (a) Solve the following system of equations using Gauss-Seidal method (three iterations) :

$$9x + 2y + 5z = 20$$

$$x + 11y + 3z = 7$$

$$2x - 5y + 19z = -18$$

- (b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by (i) Trapezoidal Rule

(ii) Simpson's $\frac{1}{3}$ Rule (iii) Simpson's $\frac{3}{8}$ rule.

- (c) Use Runge-Kutta method of fourth order to solve the differential equation

$$\frac{dy}{dx} = x^2 + y^2, y(1) = 1.5 \text{ to get } y(1.2)$$