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EAS401

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

PAPER ID : 199403

Roll No.

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 $f(z)=\frac{x^3y^5(x+iy)}{x^6+y^{10}}, z\neq 0, f(0)=0$ 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 $\sigma_x^2 = 12$, 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

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