Total No. of Questions: 5] [Total No. of Printed Pages: 4

Roll No.

401(GS)

B. E. (Fourth Semester) EXAMINATION, June, 2012

(Grading System)

(Common for all Branches)

MATHEMATICS-III

Time: Three Hours

Maximum Marks: 70

Minimum Pass Marks: 22 (D Grade)

Note: All questions are compulsory. All questions carry equal marks. Internal choices are also given.

- 1. (a) Show that the function $f(z) = e^{-z^{-4}}$, $z \neq 0$ and f(0) = 0 is not analytic at z = 0, although Cauchy-Riemann equations are satisfied at this point.
 - (b) Use Cauchy's integral formula to evaluate $\oint \frac{e^{2z}}{(z+1)^4} dz \text{ where C is the circle } |z| = 2.$

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- (a) Show that the function $u = e^{-2xy} \sin(x^2 y^2)$ is harmonic. Find the conjugate function v and express u + iv as an analytic function of z.
- (b) Define Residue and evaluate:

$$\int_0^{2\pi} \frac{d\theta}{1 - 2a\sin\theta + a^2}, 0 < a < 1$$

by using Residue theorem.

P. T. O.

- 2. (a) By using Newton-Raphson method, find the real roots of the equation $x^3 x 1 = 0$.
 - (b) Apply Gauss-Jordan method to solve the equations:

$$10x + y + z = 9$$

$$x + 10y + z = 12$$

$$x + y + 10z = 12$$

$$Or$$

- (a) Using Regula-Falsi method, compute the real root of equation $x e^x = 2$, correct to four decimal places.
- (b) Apply Gauss elimination method to solve the equations:

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

3. (a) The area 'A' of a circle of diameter 'd' is given for the following values:

d	Α
80	5026
85	5674
90	6362
95	7088
100	7854

By using appropriate interpolating formulae, find approximate values for the areas of circles of diameter 82 and 91 respectively.

(b) A slider in a machine moves along a fixed straight rod. Its distance x cm along the rod is given ahead for various values of the time t-seconds. Find the velocity of the slider and its acceleration when t = 0; 3 second:

t		\boldsymbol{x}
0.0		30 · 13
$0 \cdot 1$		31.62
0.2		32.87
0.3		33 · 64
0.4		33.95
0.5		33.81
0.6		33 · 24
	Or	

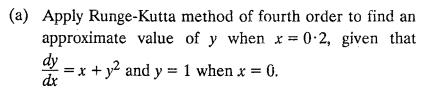
(a) Using Newton's divided difference formula, evaluate f(8) and f(15), for given values:

x	f(x)
4	48
5	100
7	294
10	900
11	1210
13	2028

- (b) Calculate by Simpson's $\frac{1}{3}$ rd rule an approximate value of $\int_0^1 \frac{dx}{1+x}$ by taking seven ordinates. Compare it with exact value and deduce the value of $\log_e 2$.
- 4. (a) Using Picard's process of successive approximation, obtain a solution upto the fifth approximation of the equation $\frac{dy}{dx} = y + x$, such that y = 1 when x = 0.
 - (b) Find the Karl Pearson's coefficient of correlation for the following data:

\boldsymbol{x}		y
10		18
14		12
18	·	24
22		. 6
26		30
30		36

Or



(b) Fit a second degree parabola, by using the concept of regression lines:

x	у
1	2
2	6
3	7
4	8
5	10
6	11
7	11
8	10
9	9

5. (a) Define the following terms:

Probability function, Probability mass function and

Probability density function.

(b) Derive the expression for mean and variance of Binomial distribution.

Or

- (a) Define Normal distribution. Give the basic properties and the standard form of Normal distribution.
- (b) Write short notes on any two of the following:
 - (i) Discrete and Continuous random variable
 - (ii) Student's t-test
 - (iii) Properties of Chi-square distribution

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