

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

Paper ID : 199321

Roll No.

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B.Tech.**(SEM. III) THEORY EXAMINATION, 2015-16****MATHEMATICS-III****[Time:3 hours]****[Maximum Marks:100]****Section-A**

Q.1 Attempt all parts. All parts carry equal marks. Write answer of each question in short. (2×10=20)

- (a) State Lagrange's interpolation formula for unequal interval.
- (b) Prove that the function $e^x(\cos y + i \sin y)$ is analytic and find its derivative.
- (c) Expand $\frac{(z-2)(z+2)}{(z+1)(z+4)}$ in the regions $|z| < 1$.
- (d) Find the missing value of the following data:

x: 1 2 3 4 5

y: 7 - 13 21 37

- (e) Define Trapezoidal rule.
- (f) The first four moments about the working mean 28.5 of a distribution are 0.294, 7.144, 42.409 and 454.98. Determine moments about mean.
- (g) Explain Time series analysis and utility of time series.
- (h) Evaluate $\int \frac{z^2 + 1}{cz^2 - 1} dz$ where C is circle $|z|=4$.
- (i) Define correlation coefficient.
- (j) In a partially destroyed laboratory record of an analysis of a correlation data, the following results are only eligible: regression: $8x - 10y + 66 = 0$; $40x - 18y = 214$. What were the mean values of x and y.

Section-B

Note: Attempt any five questions from this section. (10×5=50)

Q.2 Solve the following system of linear equations by Crout's method:

$$2x + 3y + z = 9; \quad x + 2y + 3z = 6; \quad 3x + y + 2z = 8$$

Q3. The distance covered by an athlete for the 50 metre race is given in the following table:

Time (sec):	0	1	2	3	4	5	6
Distance (metre):	0	2.5	8.5	15.5	24.5	36.5	50

Determine the speed of the athlete at $t=5$ sec. correct to two decimals.

Q4. Prove that the function $f(z)$ is defined by

$$f(z) = \frac{x^2 y^5 (x + iy)}{x^4 + y^{10}}, \quad z \neq 0 \text{ and } f(0)=0 \text{ is continuous and}$$

Cauchy-Riemann equation are satisfied at the origin, yet $f'(0)$ does not exist.

Q5. From the following table of half-yearly premium for policies maturing at different ages, Estimate the premium for policy maturing at the age of 63:

Age :	45	50	55	60	65
Premium :	114.84	96.16	83.32	74.48	68.48

(in rupees)

Q6. Use the method of least squares to obtain the normal

equations and fit the curve for $y = \frac{C_0}{x} + c_1 \sqrt{x}$ to the

following table of values:

X	0.1	0.2	0.4	0.5	1	2
Y	21	11	7	6	5	6

- Q7. The distribution of the number of road accidents per day in a city is Poisson with mean 4. Find the number of days out of 100 days when there will be (a) no accident (b) at least 2 accidents (c) at most 3 accidents.
- Q8. Records taken of the number of male and female births in 800 families having four children are as follows:

No. of male births	0	1	2	3	4
No. of female births	4	3	2	1	0
No. of families	32	178	290	236	64

Test whether the data are consistent with the hypothesis that the Binomial law holds and the chance of male birth is equal to that of female birth, namely $p=q=1/2$.

χ^2 at 5% level of significance for 4 d.f. is 9.49).

- Q9. Solve the following differential equation using Runge-Kutta method:

Give $\frac{dy}{dx} = xy$ with $x=1, y(1)=2$, Find $y(1.4)$, taking $h = 0.2$.

Section-C

Note: Attempt any two questions from this section. (15×2=30)

- Q10. (a) Find a real root of $\cos x - x^2 - x = 0$ to four decimal places by Newton-Raphson method.

- (b) What do you mean by regression analysis, explain? If for two random variables, x and y with same mean, the two regression equations are $y = ax + b$

and $x = \alpha y + \beta$ show that $\frac{b}{\beta} = \frac{1-\alpha}{1-\alpha}$.

- (c) Find the cubic Lagrange's interpolating polynomial from the following data:

X:	0	1	2	5
F(X):	2	3	12	147

- Q11. (a) Find the rank correlation coefficient of marks of A and B from of the following data:

Marks A	15	20	27	13	45	60	20	75
Marks B	50	30	55	30	25	10	30	70

- (b) Evaluate $\int_0^{1+i} (x - y + ix^2) dz$ along the straight line

$z=0$ to $z=1$ and then along a line parallel to the imaginary axis from $z=1$ to $z=1+i$.

- (c) Apply False position method to find positive root of the equation $x - e^{-x} = 0$ correct up to the three decimal places.

Q12. (a) Find the value of $\int_1^2 \frac{dx}{1+x}$ by Simpson's rule. Hence

find approximate value of $\log_e 2$.

(b) Evaluate $\int_C \frac{\sin(\pi z) + \cos(\pi z)}{(z-1)(z-2)} dz$ where C is the circle $|z| = 4$.

(c) Express $f(x) = x^4 - 12x^3 + 24x^2 - 30x + 9$ in factorial notation and its successive differences

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