

Printed Pages: 02

Sub Code: EAS-301

Paper Id:

199341

Roll No.

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**B TECH
(SEM III) THEORY EXAMINATION 2018-19
MATHEMATICS-III**

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- a. State Sufficient Conditions for function $f(z)$ to be analytic.
- b. Define Harmonic and Conjugate Harmonic function.
- c. The regression equations calculated from a given set of observation for two random variables are $x = -0.4y + 6.4$ and $y = -0.6x + 4.6$ calculate $x; \bar{y}$.
- d. Differentiate between Binomial and Poisson distribution.
- e. Prove that rate of convergence of Bisection method is 1.
- f. State the formula of Lagrange's Interpolation.
- g. Define Skewness and Kurtosis.
- h. Write down the formula for Simpson's 1/3 and 3/8 rule.
- i. Find the third divided difference with argument 2, 4, 9, 10 of the function $f(x) = x^3 - 2x$.
- j. Prove that $E = 1 + \Delta$.

SECTION B

2. Attempt any three of the following: 10 x 3 = 30

a. Find Karl Pearson Coefficient of Skewness for the following:

Years:	10	20	30	40	50	60
No. of Person:	15	32	51	78	97	109

b. Using Newton's Raphson Method solves the equation $\cos x - xe^x = 0$ correct to four decimal places.

c. Fit a second degree parabola to the following data:

x	1	2	3	4	5	6	7	8	9	10
y	124	129	140	159	228	289	315	302	263	210

d. Find the Laurent series expansion for $f(z) = \frac{7z - 2}{z^3 - z^2 - 2z}$ in the region given by :

(a) $0 < |z+1| < 1$ (b) $1 < |z+1| < 3$

e. Given the initial value problem $y' = 1 + y^2, y(0) = 0$, find $y(0.4)$ by Runge-Kutta fourth order method taking $h=0.2$.

SECTION C

3. Attempt any one part of the following:

10 x 1 = 10

(a) Fit a Poisson distribution of the following data:

Deaths	0	1	2	3	4
Frequencies	122	60	15	2	1

(b) In a blade manufacturing company, 1000 blades are examined daily. Following information shows number of defective blades obtained. Draw np- chart & give your findings.

Date	1	2	3	4	5	6	7	8	9	10
No. of defectives	9	10	12	8	7	15	10	12	10	8

4. Attempt any one part of the following:

10 x 1 = 10

(a) Find the real root of the equation $x^4 - x - 9 = 0$ by Newton-Raphson Method, correct to three places of decimal.

(b) Using Lagrange's Interpolation Formula, find $y(10)$ from the following table:

x:	5	6	9	11
y:	12	13	14	16

5. Attempt any one part of the following:

10 x 1 = 10

(a) Evaluate $\int_C \frac{e^{2z} dz}{(z+1)^4}$ where C is the circle $|z| = 3$

(b) Evaluate $\int_0^\pi \frac{\theta}{\sin \theta} d\theta$ by using contour integration.

6. Attempt any one part of the following:

10 x 1 = 10

(a) Apply the method of least squares to fit a parabola $y = a + bx + cx^2$ from the following data : (x,y) : $(-1,2), (0,0), (0,1), (1,2)$.

(b) Apply Newton's backward difference formula to the data below, to obtain a polynomial of degree 4 in x .

x	1	2	3	4	5
y	1	-1	1	-1	1

7. Attempt any one part of the following:

10 x 1 = 10

(a) Given that $\frac{dy}{dx} = 1 + xy$; $y(0) = 2$, Using Runge- Kutta Fourth order method, find $y(0.1)$, $y(0.2)$.

(b) 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.