Printed Pages: 03   **Sub Code: EAS401**

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B.TECH
(SEM IV) THEORY EXAMINATION 2017-18
MATHEMATICS III

Time: 3 Hours   *Total Marks: 100*

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

SECTION A

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

(a) Write necessary condition for a function to be analytic.

(b) Write Cauchy's Integral Formula.

(c) Give formula for Karl Pearson's coefficient of correlation.

(d) Find the moment generating function of Binomial distribution P(x) = $^nC_x p^x q^{n-x}$

where q =1-p

(e) Discuss chi-square test.

(f) What is time series analysis?

(g) Prove that $e^x = \left(\dfrac{\Delta^2}{E}\right)e^x \cdot \dfrac{Ee^x}{\Delta^2 e^x}$

(h) Write the formula for Newton forward difference interpolation method.

(i) Evaluate $\int_1^2 e^{-\frac{x}{2}}dx$ using four intervals.

(j) Write Euler's formula.

SECTION B

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

a.   Using complex integration method, evaluate $\int_0^{2\pi}\dfrac{\cos 2\theta}{5+4\cos\theta}d\theta$.

b.   Define skewness and kurtosis of a distribution. The following table represents the height of a   batch of 100 students. Calculate kurtosis & skewness.

Height (in cm)	59	61	63	65	67	69	71	73	75
No. of students	0	2	6	20	40	20	8	2	2

c.   Fit a Poisson distribution to the following data and calculate theoretical frequencies:

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

Given that $e^{-0.5} = 0.61$

d. Evaluate $\int_0^1 \dfrac{dx}{1+x^2}$ by Simposon's 1/3rd rule.

e. Solve the initial value problem $u' = -2tu^2, u(0) = 1$ with h=0.2 on the interval [0,0.4] using Runge-Kutta fourth order method.

SECTION C

3. **Attempt any *one* part of the following:** 10 x 1 = 10

   (a) Obtain the Taylor's series expansion of $f(z) = \dfrac{1}{z^2 + 4}$ about the point z = -i. Find the region of convergence.

   (b) Show that $u = x^3 - 3xy^2$ is harmonic. Also find the analytic function f(z).

4. **Attempt any *one* part of the following:** 10 x 1 = 10

   (a) In a partially destroyed laboratory record of an analysis of a correlation data, the following results only are legible: Variance of x = 9

   Regression equations: $8x - 10y + 66 = 0, 40x - 18y = 214$.

   What were **(i)** the mean values of x and y **(ii)** the standard deviation of y and the co-efficient of correlation between x and y?

   (b) Let the random variable X assume the value 'n' with the probability law P(X= n) = pq^{n-1},

   n = 1,2,3,…….. Find the moment generating function and hence mean and variance.

5. **Attempt any *one* part of the following:** 10 x 1 = 10

   (a) In a blade manufacturing factory, 1000 blades are examined daily. Draw the 'np' chart for the following table and examine whether the process is under control?

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of Defective blades	9	10	12	8	7	15	10	12	10	8	7	13	14	15	16

(b) Out of 800 families with 5 children each, how many would you expect to have
i) 3 boys ii) 5 girls, iii) either 2 boys or 3 girls. Assume equal probabilities for boys and girls.

6. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Using Regula Falsi method, compute the smallest positive root of the equation $xe^x - 2 = 0$, correct up to three decimal places.

(b) Using the following table, find *f(x)* as a polynomial in *x* using Lagrange's interpolation formula:

x	-1	0	3	6	7
$f(x)$	3	-6	39	822	1611

7. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Solve the following system of equations by Gauss-Seidal iterative method: $2x + 10y + z = 51$, $10x + y + 2z = 44$, and $x + 2y + 10z = 61$. Apply three iterations.

(b) The table given below reveals the velocity v of a body during a time *t*. Find the acceleration at *t*=1.1:

t	1.0	1.1	1.2	1.3	1.4
v	43.1	47.7	52.1	56.4	60.8