Sub Code:EAS301

Paper Id: 199341 Roll No:

B.TECH
(SEM III) THEORY EXAMINATION 2019-20
ENGINEERING 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. State the necessary and sufficient conditions for a function f(z) to be analytic.
b. State Cauchy's integral theorem.
c. Write the normal equations to fit a curve $y = ax + bx^2$ by least squares method.
d. Three urns contain 6 red, 4 black; 4 red, 6 black; 5 red, 5 black balls respectively. One of them is selected at random and a ball is drawn from it. Calculate the probability that drawn ball is red.
e. What are mean and variance of binomial distribution?
f. For what we use one way ANOVA?
g. Define order of convergence of an iterative method to find out the root of any equation.
h. Prove that $E = 1 + \Delta$
i. What is Trapezoidal rule?
j. Disscuss fourth order Runge-Kutta method for solving differential equation.

SECTION B

2. Attempt any *three* of the following: 10x3=30

a. Evaluate the following complex integration using Cauchy's integral formula $\oint_C \frac{3z^2+z+1}{(z^2-1)(z+3)} dz$, where C is the circle $|z| = 2$.
b. The first four moments of a distribution about the value 4 are -1.5, 17, -30 and 108. Find the coefficients of skewness and kurtosis.
c. (i) Show that Poisson distribution is a limiting case of Binomial distribution.
(ii)Suppose that a book of 600 pages contains 40 printing mistakes. Assume that these errors are randomly distributed throughout the book and r, the number of errors per page has a Poisson distribution. Evaluate the probability that 10 pages selected at random will be free from errors?
d. Find the root of the equation $2x - \log_{10}x = 7$ using method of False position.
e. Solve the following system of linear equations by Crout's Method:
x+y +z=3; 2x-y+ 3z=16; 3x+y- z= -3

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a. Determine the poles and residues at each pole of function $f(z) = \frac{z}{(z+1)^2(z-5)}$ and hence evaluate $\oint_C f(z)dz$, where C is the circle $|z - i| = 2$.
b. Evaluate the following integral using Contour integration $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)} dx$

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4. Attempt any *one* part of the following: 10x1=10

a. Calculate the rank correlation coefficient for the following data:

x	65	63	67	64	68	62	70	66	68	67	69	71
y	68	66	68	65	69	66	68	65	71	67	68	76

b. If θ is the acute angle between the two regression lines in the case of two variables x and y, show that $\tan\theta = \left(\frac{1-r^2}{r}\right)\left(\frac{\sigma_x \sigma_y}{\sigma_x^2+\sigma_y^2}\right)$, where r, σ_x and σ_y have their usual meanings. If the coefficient of correlation r between two variable x and y is 0.5 and $\sigma_x = \frac{1}{2}\sigma_y$ then find the angle between two regression lines.

5. Attempt any *one* part of the following: 10x1=10

a. The following table gives the number of accidents that took place in an industry during various days of the week. Test if accidents are uniformly distributed over the week. (Given that χ^2 at 5% level of significance is 11.09)

Day	Mon	Tue	Wed	Thu	Fri	Sat
No.of accidents	14	18	12	11	15	14

b. In a blade manufacturing company, 1000 blades are examined daily. Following information shows number of defective blades obtained. Draw np- chart and 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

6. Attempt any *one* part of the following: 10x1=10

a. Using Lagrange's interpolation formula find y(10) from the following data:

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

b. Following are the marks obtained by 492 candidates in a certain examination:

Marks :	0-40	40-45	45-50	50-55	55-60	60-65
No. of candidates	210	43	54	74	32	79

Find out the number of candidates who secured (i) More than 48 but not more than 50 marks. (ii) Less than 48 but not less than 45 marks.

7. Attempt any *one* part of the following: 10x1=10

a. Evaluate $\int_0^6 \frac{e^x}{1+x} dx$ approximating using Simpson's $(3/8)^{th}$ rule of integration.

b. Using Picard's method, approximate y when x=0.1, given that $\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} + y = 0$ and y=0.5 , $\frac{dy}{dx} = 0.1$ when x=0.