Paper Id: 199346 Roll No: | | | | | | | | | | | | | |

B. TECH
(SEM-III) THEORY EXAMINATION 2019-20
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. Find the residue of f(z)= $z\cos\frac{1}{z}$ at z=0.
b. Define Analytic function.
c. State modulation theorem for fourier transform.
d. Find the Z transform of $\sin ak$ k≥0.
e. Define coefficient of skewness.
f. Define marginal and conditional distribution.
g. Prove that zero operator is linear operator.
h. Define subgroup with example.
i. Define rate of convergence in bisection method.
j. Write the formula of Newton's cotes quadrature formula.

SECTION B

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

a. Apply calculus of residues to prove that $\int_0^\infty \frac{\cos ax}{1+x^2}\,dx$.
b. Find the Fourier Cosine Transform of $\frac{1}{1+x^2}$
c. Show that Poisson distribution is a limiting form of binomial distribution.
d. Show that the set $S=\{(1,0,0),(1,1,0),(1,1,1),(0,1,0)\}$ span the vector space R^3 but is not a basis set.
e. Using Crout's method to solve the following system of equations:
3x+2y+7z=4; 2x+3y+z=5; 3x+4y+z=7.

SECTION C

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

a. Show that f(z)=$|z|^2$ is not analytic at z=0, although Cauchy –Riemann equations are satisfied at that point.
b. Find the Taylor's and Laurent's series which represents the function
f(z)= $\frac{z^2-1}{(z+2)(z+3)}\,dz$ in the regions (i) 1z1<2 (ii) 2<1z1<3 (iii)1z1>3

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

a. Show that the vector x_1=(1,0,-1), x_2=(1,2,1),x_3=(0,3,-2) form a basis for R^3. Express each of the standard basis vector as a linear combination of x_1,x_2,x_3.
b. Find a maximal linearly independent subsystem of the system of vector x_1=(2,-2,-4), x_2=(1,9,3),x_3=(-2,-4,1) and x_4=(3,7,-1)

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

a. Calculate the value of β_2 for the following distribution:

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	1	20	69	108	78	22	2

b. The following data regarding the heights (y) and weight (x) of 100 college students are given $\sum x = 15000, \sum x^2 = 2272500$, $\sum y = 6800$, $\sum y^2 = 463025$ and $\sum xy = 1022250$. Find the equation of regression line of height on weight.

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

a. The union of two subspaces of a vector space is its subspace iff one is contained in the other.

b. Prove that the vector $(1,2,1),(2,1,0),(1,-1,2)$ form a basis of R^3.

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

a. Use Runge-Kutta method to find y(1.2) in step size h=0.1 given that $\frac{dy}{dx} = x^2 + y^2$ with y(1)=1.5.

b. Compute the rate of convergence of Newton Raphson Method.