# 3100

# B. Tech. 4th Semester (EE) Examination – July, 2021

## MATHEMATICS-III (Numerical Methods, Probability & Statistics)

### Paper : BSC-MATH-204-G

*Time : Three Hours ]*      *[ Maximum Marks : 75*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note :* Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) State Regula-Falsi method.

     (b) Write Newton's forward difference formula.

     (c) Write Trapezoidal rule of numerical integration.

     (d) Define transcendental equation.

(e) Explain Taylor's series method for ordinary differential equations.

(f) Write one dimensional heat equation.

(g) Define conditional probability.

(h) Define discrete random variables.

(i) Define skewness.

(j) Define hypothesis.

## UNIT – I

2. Find the positive root of $x^3 - 2x - 5 = 0$ by :

   (i) Bisection method

   (ii) Newton's method

3. Given the values :

| $x$ | : | 5 | 7 | 11 | 13 | 17 |
|---|---|---|---|---|---|---|
| $f(x)$ | : | 150 | 392 | 1452 | 2366 | 5202 |

Evaluate $f(9)$, using Newton's divided difference formula.

## UNIT – II

4. Apply Runge-Kutta method to find an approximate value of $y$ for $x = 0.2$ in steps of $0.1$, if $\frac{dy}{dx} = x + y^2$, given that $y = 1$, where $x = 0$.

5. Solve the Poisson equation :

$$U_{xx} + U_{yy} = -81xy, \; 0 < x < 1, \; 0 < y < 1 \text{ given that :}$$

$u(0, y) = 0, \; u(x, 0) = 0, \; u(1, y) = 100, \; u(x, 1) = 100$ and $h = \frac{1}{3}$.

## UNIT – III

6. Explain various discrete probability distributions in short.

7. Write short note on :

   (i) Expectation of discrete random variables.

   (ii) Variance of a sum of discrete random variables.

# UNIT – IV

**8.** Write detail note on different measures of central tendency.

**9.** Write note on :

    (i)   Large sample test for single proportion.

    (ii)  Tests for single mean.

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**B. Tech (EE) 4th Semester (G. Scheme)**
**Examination, July–2022**
**MATHEMATICS-III**
**(Numerical Methods Probability and Statistics)**
**Paper code : BSC-MATH-204-G**

*Time allowed : 3 hours]*      *[Maximum marks : 75*

**Note:** *Attempt* **five** *questions in total by selecting* **one** *question from each unit.* **Question no. 1** *is compulsory.*

1.    (a)    Define interpolation.

     (b)    Write Newton's backward difference formula.

     (c)    State Simpson's $\frac{1}{3}$ rd rule.

     (d)    State Simpson's $\frac{3}{8}$ th rule.

     (e)    Explain Euler's method for solution of ordinary differential equations.

     (f)    Write two dimensional Laplace equation.

     (g)    State Baye's theorem.

     (h)    Define discrete random variables.

     (i)    Define Kurtosis.

     (j)    Define Hypothesis testing.

### Unit-I

2. Find a root of $x^3-3x+1=0$, by using :

   (i) Bisection Method

   (ii) Newton's Raphson Method

3. Given the values :

| x: | 5 | 7 | 11 | 13 | 17 |
|----|-----|-----|------|------|------|
| f(x) | 150 | 392 | 1452 | 2366 | 5202 |

   Evaluate $f(9)$, using Lagrange formula.

### Unit-II

4. Using Runge-Kutta Method, solve $\dfrac{dy}{dx} = \dfrac{y^2-x^2}{y^2+x^2}$,

   with $y(0)=1$ at $x = 0.2, 0.4$

5. Solve the partial differential equation :

   $$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -10\,(x^2+y^2+10)$$

   over the square with sides $x = 0 = y$, $x = 3 = y$ with $u = 0$

   on the boundary and mesh length $= 1$.

### Unit-III

6. Describe the following in short :

   (i) Binomial distribution

   (ii) Poisson distribution

7. Write detail note on continuous distribution functions and densities.

### Unit-IV

8. Write detail note on hypothesis testing with the help of various test.

9. Explain Chi-Square Test for goodness of fit and independence of attributes in detail.