

Registration No :

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Total Number of Pages : 02

B.Tech  
RMA3A001

3<sup>rd</sup> Semester Regular Examination 2019-20

MATHEMATICS - III

BRANCH : AEIE, AERO, AG, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, IT, MANUTECH, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, PT

Max Marks : 100

Time : 3 Hours

Q.CODE : HR539

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

**Part- I**

**Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)**

- State the condition of the convergences for solving linear system of equation by Gauss-Seidel method
- A book has four misprints per page (on average) ,what is the probability that a page open at random will have no misprints on it
- Explain the Gauss Quadrature formula.
- What is a multistep method?
- Define type-I and type-II error in hypothesis testing.
- Write the advantages of newton divided difference method over langrage's method.
- Which is better Taylor's method or Runge-kutta method? why
- State Trapezoidal rule to evaluate  $\int_{x_0}^{x_2} f(x)dx$ , and why is Trapezoidal rule so called?
- A fair coin is tossed 400 times. If X is the number of heads obtained, find the expected value and variance of X .
- Distinguish between Binomial distribution and Normal distribution

**Part- II**

**Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)**

- Find the real root of the equation  $\cos x - x \cdot e^x = 0$  correct to three decimal place by using Newton Raphson Method.
- Solve the equation  $x^3 = 2x + 5$  and find a positive root by method of False position method
- Solve the following system of equation by using LU decomposition method.  
 $4x + y + 3z = 11$   
 $3x + 4y + 2z = 11$   
 $2x + 3y + z = 7$
- Fit a straight line  $y = a + bx$  to the following data by the method of least square :

|          |   |   |   |    |
|----------|---|---|---|----|
| <b>x</b> | 0 | 1 | 2 | 3  |
| <b>y</b> | 1 | 2 | 1 | 10 |

- In a sample of 1,000 people in Odisha, 540 are rice eater and rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance ?

- f) From the following data estimate number of students who secured marks not more than 45, by using any suitable interpolation formulae.  
 Marks range. : 30-40 40-50 50-60 60-70 70-80  
 No. of Students : 35 48 70 40 22
- g) Evaluate the integral:  $\int_2^3 \frac{\sin x}{1-x^2} dx$  by using Simpson's 1/3 rd rule.
- h) Apply Runge-Kutta method to find approximate value of y for x=0.2 in steps of 0.1 if  $\frac{dy}{dx} = x + y^2$  given that y=1 when x=0.
- i) A die is tossed thrice. A success is getting 1 or 6 on a toss, find the mean and variance of the number of successes.
- j) The Area of a circle of diameter d is given for the following rules: Find A for 105

|          |      |      |      |      |      |
|----------|------|------|------|------|------|
| <b>d</b> | 80   | 85   | 90   | 95   | 100  |
| <b>A</b> | 5026 | 5674 | 6362 | 7088 | 7854 |

- k) Using Newton's divided difference formula, calculate the value of f(6) from the following data :

|             |   |   |   |    |    |    |
|-------------|---|---|---|----|----|----|
| <b>x</b>    | 0 | 1 | 2 | 3  | 4  | 5  |
| <b>f(x)</b> | 3 | 5 | 8 | 10 | 13 | 16 |

- l) .2% of the fuses manufactured by a firm are found to be defective, find the probability that a box containing 200 fuses contains  
 (i) no defective  
 (ii) three or more defectives

**Part-III**

**Only Long Answer Type Questions (Answer Any Two out of Four)**

- Q3** Find the correlation coefficient and the equation of the lines of regression for the following values of x & y **(16)**  
 $x$  : 1 2 3 4 5  
 $y$  : 2 5 3 8 7
- Q4** Solve by using Gauss-Jacobi method and Gauss Seidel method correct to 5 decimal places and compare which method is better: **(16)**  
 $10x + y + z = 12$   
 $x + 10y + z = 12$   
 $x + y + 10z = 12$
- Q5** Use Euler's method and Modified Euler's method with one step to find the value of y at  $x = 0.1$  to five significant figures, where  $\frac{dy}{dx} = x^2 + y$  and  $y=0.94$  when  $x=0$ . **(16)**
- Q6** In a sample of 8 observations, the sum of squared deviation of items from the mean was 94.5. In other sample of 10 observations, the value was found by 101.7. Test whether the difference is significant at 5% level of significance? **(16)**