Roll No…….. **Total No. of Printed Pages: [02]**
Total No. of Questions: [09]

B. Tech. (EE, ECE, ETE, EIE, EEE) (Semester-2nd)
MATHEMATICS-II (LINEAR ALGEBRA, TRANSFORM CALCULUS AND NUMERICAL METHODS)
Subject Code: BMATH3-201
Paper ID: [19110020]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a) Given $A=\begin{bmatrix} 3 & -5 \\ -1 & 7 \end{bmatrix}$ *and* $B=\begin{bmatrix} 1 & 4 \\ 8 & 3 \end{bmatrix}$ find $A+B.$

b) Defined the symmetric matrix with example.

c) Find the determinant of the matrix $A=\begin{bmatrix} 3 & -1 \\ 4 & 3 \end{bmatrix}.$

d) Write the Simpson's 1/3rd rule.

e) Write the Newton's Forward Difference formula.

f) Write the Runge-Kutta 4th order formula to solve the differential equation.

g) Write the two dimensional Laplace equation.

h) Write the one dimensional wave equation.

i) Find the Laplace transform of $3+t^5.$

j) Find the inverse Laplace transform of $L^{-1}\left[\frac{1}{s^2+9}\right].$

Section – B **(5 marks each)**

Q2. If $A=\begin{bmatrix} 4 & -2 \\ 7 & 0 \end{bmatrix}$ *and* $B=\begin{bmatrix} 3 & 5 \\ 2 & -3 \end{bmatrix},$ then find the product of A and B.

Q3. Find the cube root of 12 using the Newton Raphson method assuming $x_0 = 2.5$.

Q4. Find the value of K_1 using Runge-Kutta method of 4th order if $\frac{dy}{dx} = 2x + 3y^2$ and $y(0.1) = 1.1165,\ h = 0.1$

Q5. Solve the $\frac{dy}{dx} - y = e^{3t},\ y(0) = 2$ by using the Laplace transform.

Q6. Find the eigen values of the matrix $A = \begin{bmatrix} 0 & -2 \\ 3 & 4 \end{bmatrix}$.

Section – C **(10 marks each)**

Q7. Evaluate $\int_0^1 e^x dx$, by Simpson's 1/3rd rule.

Q8. Using the Crank-Nicholson method, solve the equation $u_{xx} = 16u_t$ subject to $u(x,0) = 0,\ u(0,t) = 0,\ and\ u(1,t) = 100t,$ Compute $'t'$ for one time step taking $h = \frac{1}{4}$.

Q9. Let $A = \begin{bmatrix} x+y & y \\ 2x & x-y \end{bmatrix},\ B = \begin{bmatrix} 2 \\ -1 \end{bmatrix},\ C = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$. If AB=C, then find the matrix A^2.