

JK Lakshmipat University, Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), 2019
B. Tech (All Branches), Semester II

Roll No.....

MA 201: Engineering Mathematics - II

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.

- Q.1 Solve the following problems (4 questions @ 2.5 marks) 10**
- i. State the necessary condition for $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ to be exact.
 - ii. Explain the degree and order of an ordinary differential equation by taking a suitable example.
 - iii. Find the rank of matrix $\begin{bmatrix} 4 & 2 & 3 \\ 8 & 4 & 6 \\ -2 & -1 & -1.5 \end{bmatrix}$.
 - iv. Write down the standard form of a linear programming problem?
- Q.2 Solve the following differential equations. 10**
- a) $\tan x \cdot \sin^2 y \, dx + \cos^2 x \cdot \cot y \, dy = 0$
 - b) $3y' + xy = xy^{-2}$
- Q.3 Identify the type, degree and order of the following differential equation and solve 10**
- $$\left(\frac{d^2 y}{dx^2} + 2\frac{dy}{dx} + 1\right)y = 2e^{3x}.$$
- Q.4A Form partial differential equation by eliminating the arbitrary constant/functions from $z = ax^2 + by^2$ 05**
- Q.4B Solve $(y^2 + z^2)p - xyq + zx = 0$ 05**
- Q.5 Prove that the following system of equations is consistent. Solve the following system of equations using matrix method. 10**
- $$x + y + z = 9; 2x + 5y + 7z = 52; 2x + y - z = 0$$
- Q.6 Find the Eigen values and Eigen vector of a matrix $\begin{bmatrix} -2 & 1 & 1 \\ -11 & 4 & 5 \\ -1 & 1 & 0 \end{bmatrix}$. 10**
- Q.7 Explain the following concepts of linear algebra by taking suitable example(s). 10**
- a) Bases and Dimensions
 - b) The algebra of linear transformation

- Q.8** A diet for a sick person must contain at least 4,000 units of vitamins, 50 units of minerals and 1,400 calories. Two foods A and B are available at a cost of Rs. 4 and Rs. 3 per unit, respectively. If one of A contains 200 units of vitamins, 1 unit of mineral and 40 calories and one unit of food B contains 100 units of vitamins, 2 units of minerals and 40 calories. **10**
- a) Formulate a linear programming model to minimize the cost.
b) Solve this problem using graphical method.

OR

- Q.8** Solve $z^2 = pqxy$ using Charpit's method. **10**

- Q.9** Use power series method to solve $(1 - x^2)y'' - 2xy' + 2y = 0$. **20**

OR

- Q.9** Write down the dual of the following primal LP problem and thereafter solve it using simplex method. **20**

$$\text{Minimize } Z = x_1 - 2x_2 + x_3$$

Subject to: $x_1 - 2x_2 + x_3 \geq 6$; $x_1 + 12x_2 + 2x_3 \geq 14$ and $x_1, x_2, x_3 \geq 0$