



# MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

I B.Tech II Sem Regular Examination, October/November 2020

## MATHEMATICS-II (EEE, CSE & IT)

**Time: 2 Hours.**

**Max. Marks: 70**

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

- 1 a) Solve  $x \frac{dy}{dx} + y = x^3 y^6$ . 7M  
 b) Solve  $y = 2px + p^n$  7M
  
- 2 The number  $N$  of bacteria in a culture grows at a rate proportional to  $N$ . The value of  $N$  was initially 100 and increased to 332 in one hour. 14M  
 What was the value of  $N$  after  $1\frac{1}{2}$  hour?
  
- 3 a) Using the method of variation of parameters solve  $\frac{d^2y}{dx^2} + 4y = \tan 2x$ . 7M  
 b) Solve  $\frac{d^2y}{dx^2} + y = e^{-x} + x^3 + e^x \sin x$ . 7M
  
- 4 Find the mass of a plane which is formed by the coordinate planes and the plane  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ ; the density is given by  $\rho = kxyz$ . 14M
  
- 5 a) Solve  $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2 \sin(\log(1+x))$  7M  
 b) By changing the order of integration of  $\int_0^\infty \int_0^\infty e^{-xy} \sin px \, dx dy$ , show that  $\int_0^\infty \frac{\sin px}{x} \, dx = \frac{\pi}{2}$  7M
  
- 6 Prove that if  $\vec{r}$  is the position vector of any point in space then  $r^n \vec{r}$  is irrotational and is solenoidal if  $n = -3$  14M
  
- 7 a) Prove that  $\vec{f} = (x^2 + xy^2)\mathbf{i} + (y^2 + x^2y)\mathbf{j}$  is conservative and find the scalar potential. 7M  
 b) Find the integrand of conversion of the line integral of  $y\mathbf{i} + 2x\mathbf{j}$  by the application of Green's theorem. 7M
  
- 8 Verify divergence theorem for  $2x^2y\mathbf{i} - y^2\mathbf{j} + 4xz^2\mathbf{k}$  taken over the region of first octant of the cylinder  $y^2 + z^2 = 9$  and  $x = 2$ . 14M