

## I B. Tech I Semester Supplementary Examinations, May - 2018

## MATHEMATICS-I

(Com. to All branches)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **THREE** Questions from **Part-B****PART -A**

1. a) Find the integrating factor for the non exact differential equation. (4M)  
 $x^2 y dx - (x^3 + y^3) dy = 0.$
- b) Find the solution of  $y^{11} + y = \cos 2x.$  (4M)
- c) If  $L(\cos 2t) = \frac{s}{s^2 + 4}$  then find  $L\left(\int_0^t \cos 2tdt\right).$  (4M)
- d) Find the inverse Laplace transform of  $\left(\frac{1}{s(s+a)}\right).$  (4M)
- e) Formulate the partial differential equation from  $z=(x+a)(y+b)$  by eliminating 'a' and 'b'. (3M)
- f) Find the solution of the partial differential equation  $p+q = pq.$  (3M)

**PART -B**

2. a) Solve  $(xe^{xy} + 2y)\frac{dy}{dx} + ye^{xy} = 0.$  (8M)
- b) A metal ball is heated to a temperature of  $100^\circ\text{C}$  and at time  $t = 0$  it is placed in water which is maintained at  $40^\circ\text{C}$ . If the temperature of the ball reduces to  $60^\circ\text{C}$  in 4 minutes, find the time at which the temperature of the ball is  $50^\circ\text{C}$ . (8M)
3. a) Solve  $(D^3 - 3D^2 + 4)y = e^{2x} + 6 + 80\cos 2x.$  (8M)
- b) Solve  $(D^2 - 3D + 2)y = 2x^2 e^x.$  (8M)
4. a) Find  $L\left[\int_0^t \frac{1-e^{-u}}{u} du\right].$  (8M)
- b) Solve  $y''' - 3y'' + 3y' - y = t^2 e^t$  given that  $y = 1, y' = 0, y'' = -2$  at  $t = 0.$  (8M)
5. a) Determine whether the functions  $U = \frac{x}{y-z}, V = \frac{y}{z-x}, W = \frac{z}{x-y}$  are dependent. (8M)  
 If dependent find the relationship between them.
- b) Investigate the maxima and minima, if any, of the function  $f(x) = x^3 y^2 (1 - x - y).$  (8M)
6. a) Form the p.d.e by eliminating the arbitrary function  $f$  from  $xyz = f(x^2 + y^2 + z^2).$  (8M)
- b) Solve  $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy.$  (8M)
7. a) Solve PDE  $\frac{\partial u}{\partial x} - 2\frac{\partial u}{\partial y} = u$  and  $u(x,0) = 3e^{-5x} + 2e^{-3x}.$  (8M)
- b) A tightly stretched string with fixed end points  $x = 0$  and  $x = L$  is initially in a position given by  $y = y_0 \sin^3\left(\frac{\pi x}{L}\right).$  If it is released from rest from this position; find the displacement  $u(x,t).$  (8M)