

**B.Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of First Year)**

**Paper - I : Mathematics - I**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 compulsory

(15)

Answer one question from each unit

(4 x 15 = 60)

1) a) Obtain the differential equation of all circles of radius  $r$  and centre  $(h, k)$ .

b) Find the order of the differential equation

$$y''' - 4 - 6x^2 y' + e^y = \sin xy$$

c) Define orthogonal trajectory.

d) Define regression.

e) Find  $L(e^{-3t} \sin at)$

f) Find  $L^{-1}\left(\frac{S^2 - 3S + 4}{S^3}\right)$

g) Form the partial differential equation from  $z = ax + by + \frac{a}{b} - b$ .

h) Define Wronskian determinant.

i) Write general form a linear partial differential equation with an example.

j) Define dirac-delta function.

k) Define standard normal variate

l) Two regression line of the variables  $x$  and  $y$  are  $x = 19.13 - 0.87y$  and  $y = 11.64 - 0.50x$  find mean of  $x$ .

m) Find the particular Integral of  $(D^2 + 5D + 6)y = \cos 3x$

n) Solve  $(D + 1)^3 y = 0$ .

o) Write linear property of Laplace transform.

**UNIT - I**

- 2) a) Solve  $x \frac{dy}{dx} + y = x^3 y^6$ .
- b) Find the orthogonal trajectories of the family of Confocal conics  $\frac{x^2}{a^2} + \frac{y^2}{a^2 + \lambda} = 1$  where  $\lambda$  is the parameter.

OR

- 3) a) Find the complete solution of  $y'' - 2y' + 2y = e^x \cos x$ .
- b) Solve  $(1 + xy)ydx + (1 - xy) xdy = 0$ .

**UNIT - II**

- 4) a) Solve  $(D^2 - 4)y = 2\cos^2 x$
- b) Solve  $(x^2 D^2 - 4xD + 6)y = x^2$ .

OR

- 5) a) Apply the method of variation of parameters to solve  $\frac{d^2 y}{dx^2} + y = \cos ecx$ .
- b) Solve  $\frac{dx}{dt} = 3x + 2y, \frac{dy}{dt} + 5x + 3y = 0$ .

**UNIT - III**

- 6) a) Find  $L[e^{4t} \sin 2t \cos t]$ .
- b) Prove that  $L[f^n(t)] = S^n \bar{f}(s) - S^{n-1} f(0) - S^{n-2} f'(0) \dots - f^{n-1}(0)$ .

OR

- 7) a) Find  $L^{-1} \left[ \frac{S^2}{(S+1)(S+2)(S+3)} \right]$ .
- b) Solve by Laplace transform  $\frac{d^2 y}{dt^2} + 2 \frac{dy}{dt} + 5y = e^{-t} \sin t$  given that  $y(0) = 0, y'(0) = 1$ .

**UNIT - IV**

8) a) Find partial differential equation by eliminating the arbitrary constants  $a$  and  $b$  from the equation  $(x - a)^2 + (y - b)^2 = z^2 \cot^2 \alpha$ .

b) Solve  $p \tan x + q \tan y = \tan z$

OR

9) a) Solve  $\frac{\partial^3 z}{\partial x^3} - 2 \frac{\partial^3 z}{\partial x^2 \partial y} = 2e^{2x} + 3x^2 y$

b) Solve  $(D^2 + 4DD^1 + 5D^{12}) z = \sin(2x + 3y)$

