(DE 101)

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

$$y'''^{4} - 6x^2 \; y'^{8} + e^{y} = \sin xy$$

c) Define orthogonal trajector.

d) Define regression.

e) Find L (e^{-3t} sinat)

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 $x\frac{dy}{dx}+y=x^3y^6$.

b) Find the orthogonal trajectories of the family of Confocal conics $\frac{x^2}{a^2}+\frac{y^2}{a^2+\lambda}=1$ where λ 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 $(x^2D^2-4xD+6)y=x^2$.

OR

5) a) Apply the method of variation of parameters to solve $\frac{d^2y}{dx^2}+y=\cos ecx$.

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 $L\left[f^n(t)\right]=S^n\overline{f}(s)-S^{n-1}f(0)-S^{n-2}f^1(0).....-f^{n-1}(0)$.

OR

7) a) Find $L^{-1}\left[\frac{S^2}{(S+1)\,(S+2)\,(S+3)}\right]$.

b) Solve by Laplace transform $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+5y=e^{-t}\sin t$ 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 $(D^2 + 4\,DD^1 + 5D^{12})\,z = \sin(2x + 3y)$

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