B.Sc.II (with Credits)-Regular-Semester 2012 Sem. III.

B.Sc. 23112 – Mathematics Paper - II

(Differential Equations)

P. Pages : 2 **GUG/W/16/3345**

Time : Three Hours * 4 2 8 4 * Max. Marks : 60

Notes : 1. Solve **all five** questions.
2. Q.No. 1 to 4 have an alternative. Solve each question in full or it's alternative in full.
3. All question carry equal marks.

UNIT – I

1. a) Solve $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(-y+x)}$. **6**

b) Find the general solution of the PDE $x^2p + y^2q = (x+y)z$. **6**

OR

c) Show that the equations $z = px + qy$ and $2xy\left(p^2+q^2\right) = x(yp+xq)$ are compatible, Hence or otherwise solve these equations. **6**

d) Solve $Z^2 = pqxy$ by Charpit's method. **6**

UNIT – II

2. a) Solve $\left(2D^2 + 3DD' + 2D'^2\right)2 = x + y$. **6**

b) Find $\frac{1}{D^2 - D^1}\cos(ax+by)$. **6**

OR

c) Find a particular integral of $\left(D^2 - D^1\right)z = 2y - x^2$. **6**

d) The solution of a non – homogeneous $DE(aD + bD' + c)z = 0$ is **6**
$Z = e^{-cx/a}F(ay - bx),\ a \neq 0$.

UNIT – III

3. a) Find the Laplace Transform of t^n where n is positive integer. **6**

b) Find the Laplace Transform of $\sin^2 2t$ & $\sin^3 at$. **6**

OR

c) Let $L[f(t)] = F(S)$ then $L\left[t^n f(t)\right] = (-1)^n \frac{d^n}{ds^n} F(S)$, $n = 1,2,3.....$ **6**

d) Find the Laplace transform of $t^2 e^{-3t} \sin 2t$. **6**

UNIT – IV

4. a) Find the inverse Laplace Transform of $\frac{1}{s(s^2+4)}$ by the convolution theorem and verify it by the method of partial fraction. **6**

b) Find the inverse Laplace Transform of $\frac{1}{(s^2+a^2)^2}$. **6**

OR

c) Solve $\frac{d^4y}{dx^4} + \frac{d^2y}{dx^2} - 2y = 0$, $y = 0$, $y' = -1$, $y'' = 0$ & $y''' = 1$ when $x = 0$ by Laplace Transform method. **6**

d) Find the Laplace Transform of $t^2 \sin at$. **6**

5. Solve **any six.**

a) Obtain P.D.E. by eliminating arbitrary constant from the equation $Z = e^{-b^2 t} \sin b x$. **2**

b) Write the condition of Compatibility. **2**

c) Solve $r = a^2 t$ **2**

d) Solve the partial differential equation $\left(D^3 - 3D^2D^1 + 2DD'^2\right).\ Z = 0$. **2**

e) Find the PI of the equation $\left(D^2 - D^1\right)Z = e^{x-2y}$. **2**

f) Find $L[1]$. **2**

g) Find the Laplace Transform of $\frac{1-\cos t}{t^2}$ **2**

h) State Convolution theorem. **2**

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