

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2018
(Second Semester)

Branch – MATHEMATICS

DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 2 = 20)

1 Solve $(1 + xy^2)dx + (1 + x^2y)dy = 0$.

2 Solve $y = 2px + y^2p^3$.

3 Solve $(D^2 - 5D + 4)y = 0$.

4 Solve $p^3 - 7p - 6 = 0$.

5 Solve the equations $\frac{dx}{yz} = \frac{dy}{xz} = \frac{dz}{xy}$.

6 Solve $(D^2 - 3)x - 4y = 0$; $(D^2 + 1)y - x = 0$.

7 Find $L(t^2 + 2t + 3)$.

8 Evaluate $\int_0^{\infty} e^{-2t} \sin 3t \, dt$.

9 Find $L^{-1}\left[\frac{s}{s^2a^2 + b^2}\right]$.

10 Find $L^{-1}\left[\frac{s^2}{(s^2 + a^2)^2}\right]$.

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 5 = 25)

11 a Solve $y(xy + 2x^2y^2)dx - x(xy - x^2y^2)dy = 0$.

OR

b Solve $x = y + a \log p$.

12 a Solve $(D^2 - 8D + 9)y = 8 \sin 5x$.

OR

b Solve the equation $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = e^{-2x}$.

13 a Solve the equation $\frac{dx}{y - xz} = \frac{dy}{yz + x} = \frac{dz}{x^2 + y^2}$.

OR

b Solve $\frac{dx}{dt} + \frac{2}{t}(x - y) = 1$; $\frac{dy}{dt} + \frac{1}{t}(x + 5y) = t$.

Cont ...

14 a Find $L [\cosh t, \sin 2t]$.

OR

b Find $L \left[\frac{e^{-3t} - e^{-4t}}{t} \right]$.

15 a Find $L^{-1} \left[\frac{s^2}{(s-2)^2} \right]$.

OR

b Find $L^{-1} \left[\frac{1}{(s+1)(s^2 + 2s + 2)} \right]$.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Solve $y = 2px + y^2p^3$.

17 Solve the equation $(D^2 + 4D + 4) = e^{2x} + \cos 2x$.

18 Solve the simultaneous equations

$$\frac{d^2x}{dt^2} - 3x - 4y = 0;$$

$$\frac{d^2y}{dt^2} + x + y = 0.$$

19 Find (i) $L[t \cos 3t]$.

(ii) $L \left[\frac{\sin^2 t}{t} \right]$.

20 Solve the simultaneous equations

$$3 \frac{dx}{dt} + \frac{dy}{dt} + 2x = 1$$

$$\frac{dx}{dt} + 4 \frac{dy}{dt} + 3y = 0$$

Given $x = 0 = y$ at $t = 0$.

Z-Z-Z

END