

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS) ■

BSc DEGREE EXAMINATION DECEMBER 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

(10x2 = 20)

1 Solve $(x^2 + y^2)(xdx + ydy) = a^2(xdy - ydx)$

2 Solve $(D^4 - 4D^3 + 8D^2 - 8D + 4)y = 0$

3 Solve $x^2p^2 + 3xyp + 2y^2 = 0$

4 Find the particular integral of $\frac{d^2}{dx^2} = xe^x$

5 Solve the equation $\frac{dx}{dy} = \frac{z}{x}$

$-y^2 - z^2 = XY * z$

How will be the equation $\frac{dx}{dy} = \frac{z}{x}$ represent geometrically?
Q R

7 Find L $t^j - 3t^z + 2$

8 Define Piecewise continuity.

Find L $\frac{1}{(s + 2U + 16)}$

10 Find L $\frac{s}{s^2 + k^2}$

SECTION - B (25 Marks!)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5x5 = 25)

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

OR

b Solve $xyp^2 + p(3x^2 - 2y^2) - 6xy = 0$.

12 a Solve $(D^2 - 4D + 3)y = \sin 3x \cos 2x$

OR

Solve $x^2 \frac{dx}{dy} + 3x \frac{dy}{dx} + y = \frac{1}{(1-x)}$

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

OR

Solve $t dx = (t - 2x) dy$

$t dy = (tx + ty + 2x + t) dt$

14 a If $L\{f(t)\} = F(s)$, then prove that $L[tf(t)] = -\frac{dF(s)}{ds}$.

OR

b Find $L(\sin^j 2t)$.

15 a Find L $\frac{s+2}{(s^2+4s+5)^2}$

OR

Find L $^{-1} \frac{1+2s}{(s+2)^2(s-1)^2}$

SECTION - C (30 Marks)Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks (3x10 = 30)

16 Solve $x^2 (y - px) = yp^2$.

17 Solve $\frac{d^2y}{dx^2} + n^2 y = \sec wx$.

18 Solve $4\frac{dx}{dt} + 9\frac{dy}{dt} + 2x + 31y = e^t$.

$$3\frac{dx}{dt} + 7\frac{dy}{dt} + x + 24y = 3.$$

19 Evaluate (a) $\int e^{-3t} \cos t dt$.

(b) $\int_t^{-t-t} e^{-t} dt$.

20 Solve the simultaneous equations

$$\frac{dx}{dt} + \frac{dy}{dt} + 2x + 2y = 1 - 2t$$

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

with the conditions $x = 0, y = 0, \frac{dx}{dt} = 0$, when $t=0$.

Z-Z-Z**END**