PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2018
(First Semester)

Branch – **MATHEMATICS WITH COMPUTER APPLICATIONS**

DIFFERENTIAL EQUTIONS, LAPLACE TRANSFORMS & FOURIER SERIES

Time : Three Hours   Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions

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

1 Solve $p^2-5p+6=0$.

2 Find the complementary function of $(D^4+D^3+D^2)y=5x^2+\cos x$.

3 Eliminate a and b from $z=(x+a)(y+b)$.

4 Solve $p^2+q^2=4$.

5 Show that $L(e^{-at})=\frac{1}{s+a}$ provided $s+a>0$.

6 Find $L[t^2+2t+3]$.

7 Find $L^{-1}\left[\frac{s-3}{(s-3)^2+4}\right]$.

8 Find $L^{-1}\left[\frac{s}{s^2+k^2}\right]$.

9 Define even and odd functions with an examples.

10 Write the sine series formula for f(x).

SECTION - B (25 Marks)

Answer **ALL** Questions

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

11 a Solve $y-2px=x^2p^4$.

OR

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

12 a Solve $q=xp+p^2$.

OR

b Solve $p+q=x+y$.

13 a Find $L[\sinh at]$.

OR

b Find $L\{f(t)\}$ where $f(t) = 0$ when $0 < t < 2$
$= 3$ when $t > 2$.

14 a Find $L^{-1}\left[\frac{s+2}{(s^2+4s+5)^2}\right]$.

OR

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

Cont...

15 a If $f(x) = -x$ in $-\pi < x < 0$

$= x$ in $0 < x < \pi$.

Expand f(x) as a fourier series in the internal $-\pi$ to π.

OR

b Find a sine series for f(x)=c in the range 0 to π.

SECTION - C (30 Marks)

Answer any **THREE** Questions

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

16 Solve $(5+2x)^2 \dfrac{d^2y}{dx^2} - 6(5+2x)\dfrac{dy}{dx} + 8y = 6x$.

17 Solve $px(y^2+z) - qy(x^2+z) = z(x^2-y^2)$.

18 Find (i) $L\left[t^2 e^{-3t}\right]$.

(ii) $L\left[\dfrac{1-e^{t}}{t}\right]$.

19 Solve the equation $\dfrac{d^2y}{dt^2} + 2\dfrac{dy}{dt} - 3y = \sin t$ given that $y = \dfrac{dy}{dt} = 0$ when t=0.

20 Show that $x^2 = \dfrac{\pi^2}{3} + 4\sum_{n=1}^{\infty}(-1)^n \dfrac{\cos nx}{n^2}$ in the interval $-\pi < x < \pi$. Deduce that $\dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - + \dots = \dfrac{\pi^2}{12}$.

Z-Z-Z END