

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2018
(First Semester)

Branch - MATHEMATICS WITH COMPUTER APPLICATIONS

DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS & FOURIER SERIES

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions, carry EQUAL marks (10x2 = 20)

- 1 Solve: $y=(x-a)p-p^2$.
- 2 Find the value of $\frac{1}{0-7} x$.
- 3 Eliminate arbitrary function f and g from the relation $z=f(x+ay)+g(x-ay)$.
- 4 Solve $p=y^2q^2$.
- 5 Write the statement of Initial and Final Value Theorem.
- 6 Find $L(\sin^2 3t)$.
- 7 Find $L^{-1}\left(\frac{1}{(s-5)^2+25}\right)$.
- 8 Find $L^{-1}\left(\frac{1}{(s+9)^5}\right)$.
- 9 Write the formula for a_0 & a_n in the Fourier series in the interval $(0,2\pi)$ for the function $f(x)$.
- 10 If $f(x)$ is an odd function in $(-T,T)$, write the Fourier series for the function $f(x)$.

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5x5 = 25)

- 11 a Solve: $x^2p^2+3xyp+2y^2=0$.
OR
b Solve: $(D^2-4D+3)y=\cos 2x \sin 3x$.
- 12 a Solve: $p^2+q^2=npq$.
OR
b Solve: $x \frac{dz}{dx} + y \frac{dz}{dy} = (x+y)z$.
- 13 a Find $L(te^{-t} \sin t)$ OR f
b Find $L\left(\frac{\sin at}{t}\right)$
- 14 a Find $L\left(\frac{1}{y S(S+1)(S+2)}\right)$ A
OR
b Find $L^{-1}\left(\frac{s}{(s+2)^2}\right)$

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

$$= \pi - x \quad \pi < x < 2\pi$$

Find the half range series.

OR

b Find a sine series for $f(x) = c$, $0 < x < \pi$.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks ($3 \times 10 = 30$)

16 Solve: $(5+2x)^2 = 6(5+2x) + 8y = 6x$

17 Solve: $x(y-z)p + y(z-x)q = z(x-y)$.

18 Find (i) $\int_0^{\pi} t e^{3t} \cos t dt$.

o

(ii) $L(t^2 \sin 2t)$.

19 Solve the differential equation $\frac{d^2 y}{dt^2} - 2 \frac{dy}{dt} + 5y = 4e^{-t}$ given that $y = \frac{dy}{dt} = 0$ when $t=0$.

20 Find a cosine series in the range 0 to π for

$f(x) = x$, ($0 < x < \pi$)

$$= \pi - x, \quad (\pi < x < 2\pi)$$

Z-Z-Z

END