

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
BSc DEGREE EXAMINATION MAY 2017  
(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 Solve  $(D^2 - 2mD + m^2) y = 0$ .
- 3 Solve  $\frac{dz}{dx} = 0$ .

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

Find  $L^{-1} \left( \frac{1}{U^2} \right)$

6 Evaluate  $\int_0^{\pi} e^{2t} \sin 3t dt$ .

Find  $L^{-1} (s + a y)$

Write the formula to find  $L^{-1} \{f(s)\}$ .

Expand  $f(x) = x$  as a fourier series in  $(-\pi, \pi)$ .

- 10 Write the Fourier series expansion of an odd function  $f(x)$  in  $(-\pi, \pi)$ .

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5x5 = 25)

- 11 a Solve  $x^2 = 1 + p^2$ .  
OR  
b Solve  $(D^2 - 3D - 2)y = \sin 3x$ .
- 12 a Solve  $p(1 + q^2) = q(z - 1)$ .  
OR  
Solve  $z = px + qy + y^2 + p^2 + q^2$ .

- 13 a Find  $L(\sin^2 2t)$ .

OR

Find  $L^{-1} (q - e^{*})$

- 14 a Find  $L^{-1}\{s^{-3}\}$  A
- $\{(s - 3)^{-1} + 4\}$
- OR
- b Find  $L^{-1}\{(s + 2)^{-4}\}$

- 15 a Find  $a_n$  in the Fourier series expansion of  $f(x) = x$  in  $(-\pi, \pi)$ .
- OR
- b Express  $f(x) = x$  ( $-\pi < x < \pi$ ) as a Fourier series with period  $2\pi$ .

SECTION - C (30 Marks)

Answer any THREE Questions

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

- 16 Solve  $x^2 - 4x + 3 = \frac{1}{(1-x)^4}$
- 17 Solve  $(x^2 - yz)p + (p^2 - zx)q = z^2 - xy$ .
- 18 Evaluate  $\int_0^{\infty} \frac{e^{-t} - e^{-2t}}{t} dt$ .
- 19 Solve  $\frac{d^2v}{dt^2} + 2\frac{dv}{dt} - 3v = \sin t$  given that  $v(0) = v'(0) = 0$ , using inverse Laplace transforms.
- 20 Find Fourier series for
- $$f(x) = \begin{cases} 1+x & 0 < x < \pi \\ -1+x & -\pi < x < 0 \end{cases}$$

Z-Z-Z

END