14MAU07

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2017
(Third Semester) .* •

Branch- **MATHEMATICS**

PARTIAL DIFFERENTIAL EQUATIONS & FOURIER TRANSFORM

Time: Three Hours Maximum : 75 Marks

SECTION-A (20 Marks!

Answer **ALL** questions

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

Obtain a partial differential equation by eliminating a,b from Z = ax + by +a.

Solve $\frac{dZ}{dy}$ = siny.

Solve : $\frac{\partial^2 z}{\partial x \partial y}$ = xy.

4 Solve xp-yq = xy.

5 Define Fourier series.

6 A function f(x) = 7 i 2 - x 2 , - 7 t < x < 7 C , find a_0.

7 Define Fourier Transform.

8 Write Fourier sine integral.

9 Prove F_s [xf(x)] = $\frac{dFe}{ds}$

10 Define inverse finite Fourier Cosine Transform.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 2 5)

11 a Solve $\frac{d^2z}{dx^2} - 4\frac{dz}{dx} + 3z = e^{2x}$

OR

b Solve p + q = x + y.

12 a Solve ap + bq +cz =0.

OR *

b Solve pxy + pq + qy = yz.

13 a Find the Fourier series for the function f (X) = e^x define in (- xc, TC)

OR

If f (x) = x, when 0 < x < *n/2*. .

= TC - x, when $x > n/2$.

14 a Prove Fourier Transform is a linear F [af (x) + bg (x)] = a Ff (x)+bFg(x).

OR

Using Parseval's identify, prove $\int_0^\infty \left(\frac{\sin t}{t}\right)^2 dt = \frac{\pi}{2}$

Cont..

15 a - Solve — = 2———-, if u (0, t) = 0, u (x,0) = e'x ,-x > 0 and u (x, t) is bounded.
dt ^.2*dx* .

OR

b If the fourier sine transform of f (x) = i cos nx / -r—z—(0 < x < 7i), find f(x).
X27l2

SECTION - C (30 Marks)

Answer any THREE Questions

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

16 Solve a) q = xp + p^2. (b) p = >^q. (c) p (1+q^2) = q (z-1)

17 Solve (x^2 - yz) p + (p^2- zx) q = z^2 - xy.

18 Find a cosine series in the range 0 to *n* for

* f(x) = x, 0 < x < *n!2*

= *n* - x, *%!2* < x < 7i.

19 State and prove fourier integral theorem.

. 20 Show that F -l n / LK 2 +n2J ;x = sinh k(:i - x) / sinh 7ik (0 ^ X ^'7l)

Z-Z-Z END

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