Manimegalai

Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – June / July 2021
II Semester

Class : I UG | **Time : 3 Hours**
Major : Physics | **Max. Marks : 100**

18BPHI02 DSE - II Mathematics II

Part A **10 x 1 = 10**
Choose the Correct Answer

1. The value of $\int_0^2 \int_0^{\frac{x}{2}} e^{\frac{y}{x}}\, dx\, dy$

   a. e^2 b. e^2_{-1}
   c. e^2_{+1} d. e-1

2. The area of cardiod is
   a. $\frac{3\pi}{a^2}$ b. $\frac{3}{a^2}$
   c. $\frac{\pi}{a^2}$ d. $\frac{32\pi}{a^2}$

3. A function f(x) is said to be ---------- if and only if f(x+p) =f(x)
   a. periodic b. oscillating
   c. non-periodic d. odd

4. $|x|$ and $\cos x$ are examples of ------- function
   a. odd b. even
   c. odd and even d. 0

5. The $y = PX + F(P)$ is known as ---------- equation.
   a. clairauts b. lagrange
   c. linear d. none of the above

6. $L\ (\cos h\ 3t) =$ _____
   a. $\frac{s}{s^2+a^2}$ b. $\frac{s}{s^2-a^2}$
   c. $\frac{a}{s^2+a^2}$ d. $\frac{a}{s^2-a^2}$

7. L(1) =
   a. 0 b. $\frac{1}{s}$ c. $\frac{1}{s-a}$ d. $\frac{1}{s^3}$

8. $L^{-1}\left[\frac{1}{S-a}\right]$ =
   a. $\frac{1}{(s-1)^2}$ b. $\frac{2}{s-1}$
   c. $\frac{S}{s-1}$ d. $\frac{1}{s^3}$

9. $L^{-1}\left[\frac{1}{S-a}\right]$ =

a. e^{at} b. e^{-at}

c. e^{a2t} d. none of the above

10. $L^{-1}\frac{3}{(s-2)^2+3^2}$ =

a. e^{2t} *b.* $sin\,2^t$

c. $e^t\ sin^t$ d. $e^{2t}sin^{3t}$

Part B **5 x 6 = 30**

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Evaluate $\iint (x^2 + y^2)\,dx\,dy$ over region for which x, y are each ≥ 0 and $x + y \leq 0$.

(or)

11.b. Evaluate $\int_0^1 dx \int_0^x e^{\frac{y}{x}} dy$

12.a. Find the Fourier series of the function

$$f(x) = x, \quad -\pi \leq x \leq \pi.$$

(or)

12.b. Find the Fourier series of the function

$$f(x) = \begin{cases} 0, & -\pi \leq x < 0 \\ \pi, & 0 \leq x \leq \pi \end{cases}$$

13.a. **Solve**: $x^2p^2 + 3\,x\,y\,p + 2y^2 = 0$.

(or)

13.b. solve $y = px + \frac{a}{p}$

14.a. Find the Laplace transform of $Sin^2 2t$ and $sin^3 2t$.

(or)

14.b. Prove that $L\{f'(t)\} = sL\{f(t)\} - f(0)$.

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

(or)

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

Part C **5 x 12 = 60**

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Evaluate $\iint (xy\,(1-x-y)^{1/2}\,dxdy$ taken over the area of the triangle in sides x = 0, y = 0, x + y = 1.

(or)

16.b. Evaluate $\iiint xyz\,dx\,dy\,dz$ over the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$ by transforming into spherical co-ordinates.

17.a. Expand f(x) = ½ $(\pi - x)\ in\ (0, 2\pi)$ as a fourier series of periodicity 2π.

(or)

17.b. Find the fourier expansion of the function

$f(x) = \frac{(\pi - x)^2}{4}$ for $o < x < 2\pi$

18.a. **Solve :** $(D^2 + 2D + 5)y = xe^x$.

(or)

18.b. **Solve:** $p^2 + \left(x + y - \frac{2y}{x}\right)p + xy + \frac{y^2}{x^2} - y - \frac{y^2}{x} = 0.$

19.a. Find i) Find $L^{-1}\left\{\frac{s}{s^2\,a^2 + b^2}\right\}$.

(or)

19.b. Find i) Find $L\{e^{-at}\sin bt\}$ and ii)prove If L { f (t) } = F (s) then $L[f(at)] = \frac{1}{a}\,f\left(\frac{s}{a}\right)$ and if $\frac{f(t)}{t}$ has a limit as $t \to 0$.

20.a. Evaluate $L^{-1}\left(\frac{1}{s(s+1)(s+2)}\right)$.

(or)

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

****