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

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

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

20MPHC10 Mathematical Physics II

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

1. The total number of solutions of second order differential equations are CO1K2
   a. 3 b.2 c. 1 d . 5

2. Due to Liouville's theorem. CO1K1
   a. Density of states will be constant b. probability density is infinite
   c. volume of a sphere is infinity d. all eigen values are zero

3. When there is a velocity shear in a single continous fluid 'the waves formed are
   a. sine b. beta c. alpha d. Helmholtz CO2K1

4. $(r,_{\theta})$ are CO2K1
   a. polar coordinates b. spherical polar coordinates
   c. cartesian coordinates d. cylindrical coordinates

5. Laplace transform of F(t)= CO3K3
   a. ⌠e-st F(t)dt b. ⌠ F(t)dt c. dU/dx d ⌠ F(t2)

6. L(1)= CO2K1
   a. s b.1/s c.s^2 d.sxt

7. The limits of integration of Fourier series are CO4K2
   a. - ά to ά b.0.1 to 0 c.1 to 0 d.0 to ά

8. Fourier sine transform of sin άx= CO3K2
   a.0 b.1 c.100 d.10

9. Gamma half is COK3
   a.$\sqrt{\Pi}$ b.9 c.10 d.12

10. P_{2m+1} (0)= COK2
    a. 1 b. 0 c.4 d.0

Part B **5 x 6 = 30**

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Solve $dr/d_\theta = r^2/_\theta$. CO1K2

(or)

11.b. Solve Z2F''-ZF'+(1-Z)F=0 using Frobenius method. CO1K3

12.a. Brief about spherical polar coordinates. CO2K1

(or)

12.b. Express DIV and CURL in curvilinear coordinates. CO2K2

13.a. Find Laplace transform of [kt] . CO1K2

(or)

13.b. Discuss any four properties of Dirac Delta function. CO3K2

14.a.Explain the properties of FOURIER transform . CO4K2

(or)

14.b. Find FOURIER transform of $f(x)=Nexp(-\alpha x^2)$. CO4K2

15.a. Deduce the recurrence relation. CO3K2

$xJ_n'(x)= nJ_n(x)-xJ_{n+1}(x)$

(or)

15.b. What are error functions ? Explain. CO4K2

Part C **5 x 12 = 60**

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. State and prove Liouvllie theorem. CO1K2

(or)

16.b. Solve $[dy^2/dx^2]+[dy/dx]-6y = 0$. CO1K2

17.a. Discuss about Green's function and its applications. CO2K2

(or)

17.b. Obtain the solution of Laplace and Poisson equation by analytical method. CO2K3

18.a. Elaborate linearity and shifting theorems of Laplace transform. CO3K2

(or)

18.b. Use the convolution theorem to find the function whose Laplace transform are

(i)$1/(s+a)(s+b)$ (ii) $1/(s^2+a^2)^2$ CO1K2

19.a. Find finite Fourier sine and cosine transform of the function $f(x)=x^{2.}$ CO4K2

$0<x<4$

(or)

19.b. State and explain convolution theorem for CO3K2

Fourier transform.Find Fourier transform of $e^{-|t|}$.

20.a. Obtain the most general solution for the Bessel's differential equation. CO4K1

(or)

20.b. Using Rodrigue's formula arrive at first three orders of Legendre polynomials. CO1K2

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