SUB.CODE: 18UMM4C7

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DHANALAKSHMI SRINIVASAN COLLEGE OF ARTS & SCIENCE FOR WOMEN (AUTONOMOUS)

(For Candidates admitted from 2019-2020 onwards)

UG DEGREE EXAMINATIONS APRIL - 2021

B.Sc., - MATHEMATICS

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORM

Time: 3 Hrs **Max.Marks: 75**

PART - A

CHOOSE THE CORRECT ANSWER **(10X1=10)**

1. The equation is of the form $y = px + f(p)$ is known as.....

   a) clairauts equation b) Eulers equation

   c) charpits equation d) none of the above

2. The equation $Mdx + Ndy$ is said to be exact if .....

   a) $\frac{\partial M}{\partial y} = -\frac{\partial N}{\partial x}$ b) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ c) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ d) none of the above

3. The solution of $(D^2 - 5D + 4)y = 0$ is.....

   a) $y = Ae^x + Be^{4x}$ b) $y = Ae^{-x} + Be^{4x}$ c) $y = Ae^{-x} + Be^{-4x}$ d) $y = Ae^{2x} + Be^{4x}$

4. The particular integral of the equation $(D^2 - 2D + 1) = e^x$ is .....

   a) $-\frac{x^2}{2}e^x$ b) $\frac{x^2}{2}e^x$ c) $\frac{x}{3}e^x$ d) none of the above

5. A solution obtain by giving particular values to the arbitrary constants in known as.....

   a) particular integral b)complete integral c) general solution d) none of the above

6. The solution of $x + y\frac{\partial z}{\partial x} = 0$ is .....

   a) $z = \frac{-x^2}{y} + \emptyset(y)$ b) $z = \frac{-x^2}{2y} + \emptyset(y)$ c) $z = \frac{x^2}{2y} + \emptyset(y)$ d) $z = \frac{x^2}{y} + \emptyset(y)$

7. $L[\sqrt{t}]$ =.....

   a) $\frac{\sqrt{\pi}}{2s^{3/2}}$ b) $\frac{\sqrt{\pi}}{s^{3/2}}$ c) $\frac{1}{2s^{3/2}}$ d) $\frac{-\sqrt{\pi}}{2s^{3/2}}$

8. if $L[f(t)] = F(s)$ then $L[f(at)]$ =.....

   a) $F(s/a)$ b) $-\frac{1}{a}F(s/a)$ c) $\frac{1}{a}F(s/a)$ d) none of the above

9. The inverse Laplace transform of $\left(\frac{s}{s^2+k^2}\right)$ is .....

   a) $\cos kt$ b) $\cos t$ c) $sinkt$ d) none of the above

10. $L^{-1}\left[\frac{1}{s(s+a)}\right]$ =.....

a) $\frac{1}{a^2}(1-e^{-at})$ b) $\frac{1}{a}(1-e^{-at})$ c) $-\frac{1}{a}(1-e^{-at})$ d) $(1-e^{-at})$

PART - B

ANSWER ALL THE QUESTIONS **(5X7=35)**

11. a) Solve $(x+1)\frac{dy}{dx}+1=2e^{-y}$

(OR)

b) Solve $x^2p^2+3xyp+2y^2=0$

12. a) Solve $((D^2+2D+5)y=xe^x$

(OR)

b) Solve $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+y=\log x$

13. a) Solve $pxy+pq+qy=yz$

(OR)

b) Solve $P+q=x+y$

14. a) Find $L\left[\frac{\sin at}{t}\right]$

(OR)

b) Evaluate $\int_0^\infty \frac{e^{-t}-e^{-2t}}{t}\,dt$

15. a) Solve the equation $\frac{d^2y}{dt^2}+4\frac{dy}{dt}+5y=5$ given that $y(0)=0$, $y'(0)=0$ by using Laplace transform.

(OR)

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

PART - C

ANSWER ANY THREE QUESTIONS **(3X10=30)**

16. Solve $P^3+2xP^2-y^2P^2-2xy^2P=0$
17. Solve $(D^2+16)y=2e^{-3x}+\cos 4x$
18. Solve $(y^2+z^2)\frac{\partial z}{\partial x}+x\left(y\frac{\partial z}{\partial y}-z\right)=0$
19. Find the Laplace transform of the rectangular wave given by $f(t)=\begin{cases}1 & (0<t<b)\\ -1 & (b<t<2b)\end{cases}$
20. Solve the equations by using Laplace trasform $\frac{dx}{dt}+y=\sin t$, $\frac{dy}{dt}+x=\cos t$ $x(0)=2$, $y(0)=0$