

MCQ- UNIT III (DIFFERENTIAL EQUATIONS)

1. The complementary function of the differential equation $(D - 3)^2 y = e^{3x}$ is

a) $(C_1 + C_2)x e^{3x}$ b) $(C_1 + C_2)x e^{3x}$ c) $(C_1 e^{3x} + C_2 e^{-3x})$ d) none of these

Answer:(b)

2. The complementary function of $y'' - 2y' + y = x e^x \sin x$ is -----

a) $(C_1 e^x + C_2 e^{-x})$ b) $(C_1 x + C_2) e^x$ c) $(C_1 + C_2 x) e^{-x}$ d) none of these

Answer:(b)

3. The complementary function of $(D^2 + 3D - 4)y = 12e^{2x}$ is -----

a) $(C_1 e^{-4x} + C_2 e^x)$ b) $(C_1 e^{-x} + C_2 e^{-4x})$ c) $(C_1 e^{-4x} + C_2 e^{-x})$ d) none of these

Answer:(a)

4. The complementary function of $y'' + 9y = \sin^2 x$ is -----

a) $(C_1 e^{3x} + C_2 e^{-3x})$ b) $(C_1 + C_2 x) e^{3x}$ c) $C_1 \cos 3x + C_2 \sin 3x$ d)

Answer:(c)

5. The particular integral of the differential equation $(D - 3)^2 y = e^{3x}$ is -----

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

Answer:(c)

6. The particular integral of $(D^2 + 3D - 4)y = 12e^{2x}$ is -----

a) e^{2x} b) $2e^{2x}$ c) $3e^{2x}$ d) none of these

Answer:(b)

7. The particular integral of $(D^3 - 6D^2 + 11D - 6)y = e^{-2x}$ is -----

a) $\frac{e^{-2x}}{-60}$ b) $\frac{e^{-2x}}{60}$ c) $\frac{e^{-2x}}{120}$ d) none of these

Answer:(a)

8. The Wronskian of e^{2x} and $x e^{2x}$ is -----

a) e^{2x} b) e^{-2x} c) e^{4x} d) e^{-4x}

Answer:(d)

9. The Wronskian of e^x and $x e^x$ is -----

a) e^{2x} b) e^{-2x} c) e^{4x} d) e^{-4x}

Answer:(a)

10. The solution of the differential equation $(D^2 - 2D + 5)y = 0$ is -----

a) $e^{-x}(C_1 \cos 2x + C_2 \sin 2x)$ b) $e^x(C_1 \cos 2x + C_2 \sin 2x)$
c) $e^x(C_1 \cos x + C_2 \sin x)$ d) $e^{-x}(C_1 \cos x + C_2 \sin x)$

Answer:(b)

11. If $f(D) = D^2 - 2$, $\frac{1}{f(D)} e^{2x} =$ -----

a) e^{2x} b) $2e^{2x}$ c) $\frac{e^{2x}}{2}$ d) none of these

Answer:(c)

12. If $f(D) = D^2 + 36$, $\frac{1}{f(D)} 4 \cos 6x =$ -----

a) $x \sin 6x$ b) $\frac{x}{3} \sin 6x$ c) $\frac{x}{3} \cos 6x$ d) $x \cos 6x$

Answer:(b)

<p>13. The solution of the differential equation $(D^2 - D - 2)y = 0$ is -----</p> <p>a) $(C_1 e^{2x} + C_2 e^{-x})$ b) $(C_1 e^{-2x} + C_2 e^{-x})$ c) $(C_1 e^{2x} + C_2 e^x)$ d) none of these</p> <p>Answer: (a)</p>
<p>14. The solution of $(D^3 + 4D^2 + 4D)y = 0$ is -----</p> <p>a) $(C_1 + C_2 x)e^{-2x}$ b) $C_1 + (C_2 + C_3 x)e^{-2x}$</p> <p>c) $C_1 + (C_2 + C_3 x)e^{2x}$ d) $(C_1 + C_2 x)e^{2x}$</p> <p>Answer: (b)</p>
<p>15. $(C_1 e^{-6x} + C_2 e^{2x})$ is the general solution of the equation -----</p> <p>a) $y'' + 4y' - 12y = 0$ b) $y'' - 4y' - 12y = 0$</p> <p>c) $y'' - 4y' + 12y = 0$ d) $y'' + 4y' + 12y = 0$</p> <p>Answer: (a)</p>
<p>16. $C_1 \cos 2x + C_2 \sin 2x$ is the general solution of the equation -----</p> <p>a) $y'' - 4y = 0$ b) $y'' + 4y = 0$ c) $y'' - 2y = 0$ d) $y'' + 2y = 0$</p> <p>Answer: (b)</p>
<p>17. $C_1 \cos \sqrt{2}x + C_2 \sin \sqrt{2}x$ is the general solution of the equation -----</p> <p>a) $(D^2 - 2)y = 0$ b) $(D^2 - 4)y = 0$ c) $(D^2 + 2)y = 0$ d) none of these</p> <p>Answer: (c)</p>
<p>18. The particular integral of $(D^2 + 4)y = \cos 2x$ is -----</p> <p>a) $\frac{\sin 2x}{2}$ b) $\frac{x \sin 2x}{2}$ c) $\frac{x \sin 2x}{4}$ d) $\frac{x \cos 2x}{2}$</p> <p>Answer: (c)</p>
<p>19) The particular integral of $(D^2 + D)y = x^2 + 2x + 4$ is -----</p> <p>a) $\frac{x^2}{3} + 4x$ b) $\frac{x^3}{3} + 4$ c) $\frac{x^3}{3} + 4x$ d) $\frac{x^3}{3} + 4x^2$</p> <p>Answer: (c)</p>
<p>20. The complementary function of the differential equation $x^2 y'' - xy' - y = \log x$ is -----</p> <p>a) $(C_1 + C_2 \log x)x$ b) $C_1 + C_2 x \log x$ c) $C_1 x + C_2 \log x$ d) $(C_1 + C_2 x) \log x$</p> <p>Answer: (a)</p>
<p>21. The complementary function of the differential equation $x^2 y'' - xy' - y = 2x \log x$ is -----</p> <p>a) $(C_1 + C_2 \log x)x$ b) $(C_1 + C_2 x) \log x$ c) $(C_1 + C_2 \log x)e^x$ d) none of these</p> <p>Answer: (d)</p>
<p>22. The particular integral of $(D^2 - 4)y = \sin 3x$ is -----</p> <p>a) $\frac{1}{4}$ b) $\frac{-1}{3}$ c) $\frac{1}{5}$ d) none of these</p> <p>Answer: (d)</p>
<p>23. The homogeneous linear differential equation whose auxiliary equation has the roots 1, -1 is -----</p> <p>a) $x^2 y'' + xy' - y = 0$ b) $x^2 y'' - xy' + y = 0$ c) $x^2 y'' - xy' - y = 0$ d) none of these</p> <p>Answer: (a)</p>
<p>24. The differential equation whose auxiliary equation has the roots 0, 1, -1 is -----</p> <p>a) $(D^3 - 2D^2 + D)y = 0$ b) $(D^3 + 2D^2 + D)y = 0$ c) $(D^3 - 2D^2 - D)y = 0$ d) none of these</p> <p>Answer: (b)</p>
<p>25. The general solution of $y''' - y'' + y' - y = 0$ is -----</p> <p>a) $y = e^x(C_1 + C_2 \sin 2x + C_3 \cos 2x)$ b) $y = C_1 e^x + C_2 \sin 2x + C_3 \cos 2x$</p> <p>c) $y = C_1 e^{-x} + C_2 \sin x + C_3 \cos x$ d) $y = C_1 e^x + C_2 \sin x + C_3 \cos x$</p> <p>Answer: (d)</p>
<p>26. Solution of the initial value problem $y'' - 4y' - 5y = 0$ for $y(0)=0$ and $y'(0) = 6$ is -----</p>

a) $y = e^{3x} + 3e^{-3x}$ b) $y = 5e^{5x} - e^{-x}$ c) $y = -e^{3x} - 3e^{-3x}$ d) $y = e^{5x} - e^{-x}$

Answer:(d)

27. The complementary function of $y'' + y' - 12y = \cos 3x$ is -----

a) $(C_1 e^{3x} + C_2 e^{-4x})$ b) $(C_1 x e^{3x} + C_2 e^{-4x})$ c) $(C_1 e^{-3x} + C_2 e^{4x})$ d) $(C_1 x e^{3x} + C_2 e^{4x})$

Answer:(a)

28. The general solution of $y''' + 2y'' - 11y' - 12y = 0$ is -----

a) $y = C_1 e^{-3x} + C_2 e^{4x} + C_3 e^x$ b) $y = C_1 e^{2x} + C_2 e^{-6x} + C_3 e^{-x}$

c) $y = C_1 e^{3x} + C_2 e^{-4x} + C_3 e^{-x}$ d) $y = C_1 e^{-3x} + C_2 e^{4x} + C_3 e^{-x}$

Answer:(c)

29. Consider the differential equation $\frac{d^2 y}{dx^2} - 49y = 0$. Which of the following option is correct?

a) The roots of the auxiliary equation are 0 and 7

b) There is no auxiliary equation for a differential equation of this type.

c) The auxiliary equation has a repeated root of 7.

d) The roots of the auxiliary equation are 7 and -7.

Answer:(d)

30. The particular solution to $\frac{d^2 y}{dx^2} - 3\frac{dy}{dx} - 4y = 0$ satisfying $y(0)=0$ and $y'(0) = 5$ is -----

a) $y = e^x - e^{-4x}$ b) $y = e^{-x} - e^{4x}$ c) $y = e^{-4x} - e^x$ d) $y = e^{4x} - e^{-x}$

Answer:(d)

31. The order of the differential equation $\frac{d^2 y}{dx^2} + \left(\frac{dy}{dx}\right)^3 + y^4 = e^{-x}$ is -----

a) 1 b) 2 c) 3 d) 4

Answer:(b)

32. The particular integral of the differential equation $\frac{d^2 y}{dx^2} - 8\frac{dy}{dx} + 16y = 2e^{4x}$ is -----

a) $x e^{4x}$ b) $x^2 e^{4x}$ c) $x e^{-4x}$ d) $x^2 e^{-4x}$

Answer:(b)

33. The particular integral of the differential equation $f(D)y = e^{ax}$ where $f(D) = (D - a)^2$ is -----

a) $\frac{x^2}{2} e^{ax}$ b) $x e^{ax}$ c) $\frac{x}{2} e^{ax}$ d) $x^2 e^{ax}$

Answer:(a)

34. The complementary function of the differential equation $\frac{d^2 y}{dx^2} - \frac{dy}{dx} = 0$ is -----

a) $(C_1 + C_2 e^x)$ b) $(C_1 + C_2) e^x$ c) $(C_1 x + C_2) e^x$ d) $C_1 e^{-x} + C_2$

Answer:(a)

35. The particular integral of $(3D^2 - D - 14)y = 13e^{2x}$ is -----

a) $\frac{x}{2} e^{2x}$ b) $x e^{2x}$ c) $13x e^{2x}$ d) $\frac{x^2}{2} e^{2x}$

Answer:(b)

36. The particular integral of $(D + 5)(D - 4)y = 1000$ is -----

a) 50 b) -50 c) 100 d) -100

Answer:(b)

37. To transform $x \frac{d^2 y}{dx^2} + \frac{dy}{dx} = \frac{1}{x}$ in to a linear differential equation with constant coefficients put $x =$ -----

a) $\log t$ b) e^{-t} c) e^t d) $\frac{1}{\log t}$

Answer:(c)

38. The solution of $x^2 y'' + xy' = 0$ is -----

a) $y = C_1 + C_2 \log x$ b) $y = C_1 + C_2 x \log x$ c) $y = C_1 x + C_2 \log x$ d) $y = (C_1 + C_2 \log x)x$

Answer:(a)

39. The solution of $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 4y = 0$ is -----

- a) $y = C_1 e^x + (C_2 + C_3 x)e^{-2x}$ b) $y = C_1 e^{-x} + (C_2 + C_3 x)e^{2x}$
c) $y = C_1 e^{-x} + C_2 e^{2(1+\sqrt{2})x} + C_3 e^{2(1-\sqrt{2})x}$ d) none of these

Answer:(b)

40. The particular integral of $(D^2 - 6D + 9)y = \log 2$ is -----

- a) $\frac{\log 2}{4}$ b) $\frac{\log 2}{3}$ c) $\frac{\log 2}{9}$ d) none of these

Answer:(c)

41. The particular integral of $(D^3 + 4D)y = \sin 2x$ is -----

- a) $\frac{x}{8} \sin 2x$ b) $\frac{x}{8} \cos 2x$ c) $\frac{-x}{8} \cos 2x$ d) $\frac{-x}{8} \sin 2x$

Answer:(d)

42. The particular integral of $(D^2 - 2D + 4)y = e^x \cos x$ is -----

- a) $\frac{e^x}{2} \cos x$ b) $\frac{e^x}{2} \sin x$ c) $\frac{-e^x}{2} \sin x$ d) $\frac{-e^x}{2} \cos x$

Answer:(a)

43. The complete solution of $\frac{d^2x}{dt^2} + 6\frac{dx}{dt} + 9x = 0$ is -----

- a) $x = (C_1 + C_2 t)e^{-3t}$ b) $x = C_1 + C_2 e^{-3t}$ c) $x = (C_1 + C_2 t)e^{3t}$ d) $x = C_1 + C_2 e^{3t}$

Answer:(a)

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

- a) $(C_1 + C_2 x)e^{\sqrt{2}x} + (C_3 + C_4 x)e^{-\sqrt{2}x}$ b) $C_1 + C_2 x e^{\sqrt{2}x} + C_3 + C_4 x e^{-\sqrt{2}x}$
c) $C_1 e^{\sqrt{2}x} + C_2 e^{-\sqrt{2}x} + C_3 e^{\sqrt{2}x} + C_4 e^{-\sqrt{2}x}$ d) none of these

Answer:(a)

45. The particular integral of $(D^2 + 5D + 6)y = e^x$ is -----

- a) $\frac{e^x}{6}$ b) $\frac{e^x}{12}$ c) $\frac{-e^x}{6}$ d) $\frac{-e^x}{12}$

Answer:(b)

46. The particular integral of $(D^3 + 1)y = \cos 2x$ is -----

- a) $\frac{\cos 2x - 8 \sin 2x}{65}$ b) $\frac{8 \sin 2x - \cos 2x}{65}$ c) $\frac{8 \cos 2x - \sin 2x}{65}$ d) $\frac{\sin 2x - 8 \cos 2x}{65}$

Answer:(a)

47. The particular integral of $(D + 2)(D - 1)^2 y = e^{-2x}$ is -----

- a) $\frac{x e^{2x}}{9}$ b) $\frac{-x e^{-2x}}{9}$ c) $\frac{x e^{-2x}}{9}$ d) $\frac{-x e^{2x}}{9}$

Answer:(c)

48. For the differential equation $(D^2 + 4)y = \tan 2x$ the value of the Wronskian is -----

- a) 2 b) -2 c) 4 d) -4

Answer:(a)

49. The linear differential equation with constant coefficients corresponding to the equation

$x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = \log x$ is -----

- a) $(D + 1)^2 y = t$ b) $(D - 1)^2 y = t$ c) $(D + 1)^2 y = x$ d) $(D - 1)^2 y = x$

Answer:(b)

50. The linear differential equation with constant coefficients corresponding to the equation

$$x^2 \frac{d^2 y}{dx^2} + 4x \frac{dy}{dx} + 2y = e^x \text{ is } \text{-----}$$

$$\text{a)} (D^2 + 3D + 2)y = e^t \quad \text{b)} (D^2 + 3D + 2)y = e^{e^t}$$

$$\text{c)} (D^2 - 4D + 2)y = e^t \quad \text{d)} (D^2 - 4D + 2)y = e^{e^t}$$

Answer:(b)

