Objective Question Bank

LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS

1. Find the PI of $(D^2 - 4)y = 1$

(a)$-\frac{1}{6}$ (b)$-\frac{1}{5}$ (c)$-\frac{1}{4}$ (d)$\frac{1}{4}$

Answer: c

2. Find the PI of $(D^5 - D)y = 12e^x$

(a)xe^x (b)$-xe^x$ (c)$-3xe^x$ (d)$3xe^x$

Answer: d

3. Find the PI of $(D^2 + 4)y = cos2x$

(a)$\frac{x}{4}sin2x$ (b)$\frac{x}{4}cos2x$ (c)$\frac{x}{2}sin4x$ (d)$x\ sin2x$

Answer: a

4. Find the PI of $(D^2 + 1)y = sinx$

(a)$\frac{x\cos x}{2}$ (b)$\frac{-x\cos x}{2}$ (c)$\frac{-xsin\,x}{2}$ (d)$\frac{x\sin x}{2}$

Answer: b

5. Find the PI of $(D^2 - 1)y = x$

(a)x (b)x^2 (c)$-x$ (d)-1

Answer: c

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6. Transform the given equation in to Linear form $x^2y'' - 4xy' + 6y = x^2 + \log x$

a) $(D'^2 + 2D' + 5)y = e^{2z} + z$ b) $(D'^2 - 5D' + 6)y = e^z + z$

c) $(D'^2 - 5D' + 6)y = e^{2z} + z$ d) $(D'^2 + 5D' + 6)y = e^z + z$

Answer: c

7. Find the CF of $(x^2D^2 - 2xD - 4)y = 0$

a) Alogx+Bx b) Alogx+Bx^4 c) Ax+Bx^4 d) Ax^{-1}+Bx^4

Answer: d

8. Find the PI of $(x^2D^2 + xD)y = 12\log x$

a) logx b) Alogx+B c) 2(logx)^3 d) Ae^x+Be^{2x}

Answer: c

9. Find the PI of $(x^2D^2 - xD + 1)y = \sin(\log x)$

a) sin(logx) b) cos(logx) c) (1/2)(logx) d) (1/2)cos(logx)

Answer: d

10. Transform the given equation into Linear form $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \log x$

a) $(D'^2 - D' + 1)y = z$ b) $(D' - 1)^2 y = 0$

c) $(D' - 1)^2 y = z$ d) $(D'^2 + 1)y = 0$

Answer: c

11. Transform the equation $(2x+3)^2\frac{d^2y}{dx^2}-2(2x+3)\frac{dy}{dx}-12y=6x$ into linear form with constant coefficients.

a) $(D'^2-2D'-3)y=\frac{1}{2}(e^z-9)$ b) $(D'^2-D'-3)y=\frac{1}{4}(e^z-9)$

c) $(D'^2-2D'-3)y=\frac{1}{2}(3e^z-9)$ d) $(D'^2-2D'-3)y=\frac{1}{4}(3e^z-9)$

Answer: d

12. The CF of the equation $(x+2)^2\frac{d^2y}{dx^2}-(x+2)\frac{dy}{dx}+y=3x+4$ is

a) $[A\log(x+2)+B]$ b) $[A\log x+B](x+2)$

c) $[A\log(x+2)+B](x+2)$ d) $[Ax+B](x+2)$

Answer: c

13. The PI of the equation $(x+1)^2\frac{d^2y}{dx^2}+(x+1)\frac{dy}{dx}+y=4\{\cos(\log(x+1)\}$ is

a) 2zsinz b) zsinz c) 2zcosz d) zcosz

Answer: a

14. Transform the equation $(x+1)^2\frac{d^2y}{dx^2}+(x+1)\frac{dy}{dx}+y=2\{\sin(\log(x+1)\}$ into linear form with constant coefficients.

a) $(D'^2+1)y=\cos z$ b) $(D'^2-1)y=\cos z$ c) $(D'^2+1)y=2\cos z$ d) $(D'^2+1)y=2\sin z$

Answer: d

15. Transform the equation $(3x+2)^2\frac{d^2y}{dx^2}+3(3x+2)\frac{dy}{dx}-36y=3x^2+4x+1$ into linear form with constant coefficients.

a) $(D'^2-4)y=\frac{1}{27}(e^z-1)$ b) $(D'^2+4)y=\frac{1}{27}(e^{2z}-1)$

c) $(D'^2+4)y=\frac{1}{27}(e^z-1)$ d) $(D'^2-4)y=\frac{1}{27}(e^{2z}-1)$

Answer: d

16. The wronskian of f_1, f_2 is given by

a) $f_1'-f_2'$ b) $f_1'f_2-f_1f_2'$ c) $f_1f_2'-f_2f_1'$ d) $f_1f_2'-f_2'f_1'$

Answer: c

17. While solving the differential equation $(D^2 + 4) = \sec 2x$,by method of variation of parameters and if $f_1=\cos 2x$, $f_2=\sin 2x$ and wronskian w = 2, then Q is

a) $\frac{1}{4}\log\cos 2x$ b) x/2 c) (1/4)log sin2x d) (1/4)cos2x

Answer: b

18. If $\frac{d^2y}{dx^2}+y=\text{cosec x}$, $f_1=\cos x$, $f_2=\sin x$ and wronskian w = 1, then P is

a) -x b) x c) sin x d) log sin x

Answer: a

19. While solving $(D^2 - 4D + 4)y = e^{2x}$ by method of variation of parameters, then f_1, f_2 is

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

Answer: b

20. While solving $(D^2 + 2D + 5)y = e^{-x} \tan x$ by method of variation of parameters, then f_1, f_2 is

a) cos2x,sin2x b) cosx,sinx c) e^{-x}cos2x, e^{-x}sin2x d) e^{-x}cos5x, e^{-x}sin5x

Answer: d

21. If $\frac{dx}{dt} - y = 0$ and $\frac{dy}{dt} + x = 0$ then the solution of x is

a) Acost+Bsint b) –Acos2t+Bsin2t c) Acost-Bsint d) Acos2t+Bsin2t

Answer: a

22. If $\frac{dx}{dt} - y = 0$ and $\frac{dy}{dt} + x = 0$ then the solution of y is

a) Acost+Bsint b) –Asint+Bcost c) Acost-Bsint d) Acos2t+Bsin2t

Answer: b

23. If $\frac{dx}{dt} + 2y = \sin 2t$ and $\frac{dy}{dt} - 2x = \cos 2t$ then the Linear equation of y is

a) $(D^2 + 4)y = \cos 2t$ b) $(D^2 + 4)y = 0$

c) $(D^2-4)y=0$ d) $(D^2+4)y=\sin 2t$

Answer: b

24. If $\frac{dx}{dt}+y=\sin t$ and $\frac{dy}{dt}+x=\cos t$ then the Linear equation of y is

a) $(D^2+1)y=\cos 2t$ b) $(1+D^2)y=2\sin t$

c) $(D^2-4)y=0$ d) $(1-D^2)y=2\sin t$

Answer: d

25. Eliminate y from the system, If $\frac{dx}{dt}+2y=-\sin t$ and $\frac{dy}{dt}-2x=\cos t$

a) $(D^2+4)x=-3\sin t$ b) $(D^2+4)x=-3\cos t$

c) $(D^2+4)x=0$ d) $(D^2+4)x=3\cos t$

Answer: b