Topics: Differential Equations-I

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Q.1.If $\frac{1}{N}\left(\frac{\partial M}{\partial Y}-\frac{\partial N}{\partial X}\right)=\frac{-1000}{X}$ then integrating factor

a) X^{-1000} b) X^{-1000} c) X^{-1000} d) X^{-1000}

Ans. a) X^{-1000}

Q.2.For exact differential Equation of the form $Mdx+Ndy=0$

a) $\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$ b) $\frac{\partial M}{\partial y}\neq\frac{\partial N}{\partial x}$ c) $\frac{\partial M}{\partial y}+\frac{\partial N}{\partial x}=0$ d) $\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}=0$

Ans. a) $\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$

Q.3.The signature of the O.D.E $y'+Py=Qy^n, n\neq 1$

a) Bernoulli's equations b) Gaussian equations c) Basseles equations d) Legendre's equations

Ans. a) Bernoulli's equations

Q.4.Integrating factor of $\frac{dr}{d\theta}=500\theta^n-\frac{r}{\theta}$

a) θ b) 2θ c) 3θ d) 4θ

Ans. a) θ

Q.5.Integrating factor of $dy=\{e^{x-y}(e^x-e^y)\}dx$

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

Ans. a) e^{e^x}

Q.6.If Mdx+Ndy=0, have the form fydx+gxdy=0 the I.F.

a) $\frac{1}{Mx-Ny}$ b) $\frac{1}{Mx+Ny}$ c) $\frac{1}{Mx-Ny\neq 0}$ d) $\frac{1}{Mx-Ny=0}$

Ans. c) $\frac{1}{Mx-Ny\neq 0}$

Q.7. $y=e^{600x}$ is a solution of

a) $y'=600y$ b) $y'=800y$ c) $y'=-600y$ d) $y'=-800y$

Ans. a) $y'=600y$

Q.8.The differential Equations regarding the family of the curve $y=e^{500x}$

a) $xy'=y\log y$ b) $xy'=x\log x$ c) $yy'=y\log y$ d) $x+y'=y\log y$

Ans. a) $xy'=y\log y$

Q.9.The required solution of $\sec^2 x\tan ydx+\sec^2 y\tan xdy=0$

a) tanx tany=k b) tanx+tany=k c) tanx-tany=k d) tanx/tany=k

Ans. a) tanx.tany=k

Q.10.If $Q(x)=e^{100x}V(x)$ then P.I.

a) $e^{100x}\frac{1}{f(D+100)}V(x)$ b) $e^{200x}\frac{1}{f(D+200)}V(x)$ c) $e^{-100x}\frac{1}{f(D-100)}V(x)$ d) $e^{-200x}\frac{1}{f(D-200)}V(x)$

Ans. a) $e^{100x}\frac{1}{f(D+100)}V(x)$

Q.11.The roots of A.E. is $[100\pm\sqrt{500}]$ them C.F.

a) $e^{100x}(A\cosh\sqrt{500}x+B\sinh\sqrt{500}x$ b) $e^{100x}(A\cos\sqrt{500}x+B\sin\sqrt{500}x$

c) $e^{100x}(A\cosh\sqrt{500}\,x - B\sinh\sqrt{500}\,x$ d) $e^{100x}(A\cos\sqrt{500}\,x - B\sin\sqrt{500}\,x$

Ans. a) $e^{100x}(A\cosh\sqrt{500}\,x + B\sinh\sqrt{500}\,x$

Q.12.Complemtry function of $(D^2+4)y = \tan 200x$

a) $(ACos2x + BSin2x)$ b) $(ACos2x - BSin2x)$ c) $(ACosh2x + BSinh2x)$ d) $(ACosh2x - BSinh2x)$

Ans. a) $(ACos2x + BSin2x)$

Q.13. Integrating factor of $y\dfrac{dx}{dy} = -2x + 10y^3$

a) y b) y+1 c) y+3 d) none of these

Ans. d) none of these

Q.14.Degree of ODE $\dfrac{d^2y}{dx^2} + 2\left(\dfrac{dy}{dx}\right)^2 = x^2\log\left(\dfrac{d^2y}{dx^2}\right)$

a) One b) two c) four d) undefined

Ans. d) undefined

Q.15.If the root of A.E. are (-1000,-1000) then C.F.

a) $(A+Bx)e^{-1000x}$ b) $(A-Bx)e^{-1000x}$ c) $(A+Bx)e^{-2000x}$ d) $(A-Bx)e^{-2000x}$

Ans. a) $(A+Bx)e^{-1000x}$

Q.16.P.I.of ODE $(D^2+D-2)y = e^x$

a) $\dfrac{xe^2}{3}$ b) $\dfrac{xe^2}{4}$ c) $\dfrac{xe^2}{5}$ d) $\dfrac{xe^2}{6}$

Ans. a) $\dfrac{xe^2}{3}$

Q.17.Integrating factor of $y' + 3(\cos ecx)y = \cot x$

a) $\tan^1\left(\frac{x}{2}\right)$ b) $\tan^2\left(\frac{x}{2}\right)$ c) $\tan^3\left(\frac{x}{2}\right)$ d) $\tan^4\left(\frac{x}{2}\right)$

Ans .c) $\tan^3\left(\frac{x}{2}\right)$

Q.18.The order and degree of the ODE $\frac{d^4y}{dx^4} = \cos\left(\frac{d^3y}{dx^3}\right) = 0$

a) Order=4, degree=1 b) order=3 degree=1 c) order=4, degree= defined d) order=4, degree= undefined

Ans. d) order=4, degree=undefined

Q.19.Particular integral of $(D^2 - 3D + 2)y = e^{5x}$

a) $\frac{e^{5x}}{12}$ b) $\frac{e^{5x}}{13}$ c) $\frac{e^{5x}}{14}$ d) $\frac{e^{5x}}{15}$

Ans. a) $\frac{e^{5x}}{12}$

Q.20. which is the linear differential equations

a) $\frac{dy}{dx} + y\cos x = \sin x$ b) $\frac{d^4y}{dx^4} = \left(k + (y')^2\right)^{3/2}$ c) $\frac{d^4y}{dx^4} = \cos\left(\frac{dy}{dx}\right)$ d) none of these

Ans. a) $\frac{dy}{dx} + y\cos x = \sin x$

Q.21.If $\frac{dy}{dx} = \frac{ax + by + c}{\kappa x + \rho y + \lambda}$, where $\frac{a}{\kappa} = \frac{b}{\rho}$ then is reducible to

a) Homogeneous form b) Variable separable form c) Exact form d) Non-exact form

Ans. b) Variable separable form

Q.22.The DE $\left(1+(y')^2\right)^3 = r^2\left(\frac{d^2y}{dx^2}\right)$ represents

a) Family of circle of radius "r" b) family of sphere of radius "r" c) family of ellipse d) family of parabola

Ans. a) Family of circle of radius 'r'

Q.23.The order of differential equation is always

a) Positive integer b) Negative integer c) Rational number d) Whole number

Ans. a) Positive integer

Q.24.If $Q(x) = e^{500x}$ and $f(500) = 0$ then P.I.

a) $\frac{1}{\phi(500)}e^{500x}.\frac{x^r}{!r}$ b) $\frac{1}{\phi(100)}e^{100x}.\frac{x^r}{!r}$ c) $\frac{1}{\phi(-500)}e^{-500x}.\frac{x^r}{!r}$ d) $\frac{1}{\phi(1000)}e^{500x}.x$

Ans. a) $\frac{1}{\phi(500)}e^{500x}.\frac{x^r}{!r}$

Q.25. The integrating factor of $x\log x\frac{dy}{dx} + y = 2\log x$

a) logx b) log2x c) log3x d)log4x

Ans. a) logx

Topics: Laplace Transform

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Q.1.If $L^{-1}\left[\frac{e^{-1/s}}{\sqrt{s}}\right]=\frac{\cos 2\sqrt{t}}{\sqrt{\pi t}}$ then $L^{-1}\left[\frac{e^{-1000/s}}{\sqrt{s}}\right]$?

a) $\frac{\cos 2\sqrt{1000t}}{\sqrt{\pi t}}$ b) $\frac{\cos 2\sqrt{2000\,t}}{\sqrt{\pi t}}$ c) $\frac{\cos 2\sqrt{3000\,t}}{\sqrt{\pi t}}$ d) $\frac{\cos 2\sqrt{4000\,t}}{\sqrt{\pi t}}$

Ans. a) $\frac{\cos 2\sqrt{1000\,t}}{\sqrt{\pi t}}$

Q.2.Laplace transform of $H[(t-900)]=\begin{Bmatrix}0, t<900\\ 1, t>900\end{Bmatrix}$

a) $\frac{e^{-900s}}{s}$ b) $\frac{e^{900s}}{s}$ c) $\frac{e^{-1800s}}{s}$ d) $\frac{e^{1800s}}{s}$

Ans. a) $\frac{e^{-900s}}{s}$

Q.3.Find $L^{-1}\left[\overline{f}(100,s)\right]$?

a) $\frac{1}{100}f\left(\frac{t}{100}\right)$ b) $\frac{1}{200}f\left(\frac{t}{200}\right)$ c) $-\frac{1}{100}f\left(\frac{t}{100}\right)$ d) $-\frac{1}{200}f\left(\frac{t}{200}\right)$

Ans. a) $\frac{1}{100}f\left(\frac{t}{100}\right)$

Q.4.Find $L^{-1}\left[\frac{1}{(s-1000)^2+400}\right]$

a) $\frac{1}{20}e^{1000t}Sin20t$ b) $\frac{1}{-20}e^{-1000t}Sin20t$ c) $\frac{1}{10}e^{500t}Sin20t$ d) $\frac{1}{-10}e^{-500t}Sin20t$

Ans. a) $\frac{1}{20}e^{1000t}Sin20t$

Q.5.Laplace transform of Dirac delta function

a) 0 b)1 c) 2 d) 3

Ans. b)1

Q.6.If $L[f(t)] = \overline{f}(s)$ then $L[f(500t)]$

a) $\frac{1}{500}\overline{f}\left(\frac{s}{500}\right)$ b) $\frac{1}{-500}\overline{f}\left(\frac{s}{-500}\right)$ c) $\frac{1}{250}\overline{f}\left(\frac{s}{250}\right)$ d) $\frac{1}{-250}\overline{f}\left(\frac{s}{-250}\right)$

Ans. a) $\frac{1}{500}\overline{f}\left(\frac{s}{500}\right)$

Q.7. Find $L\left(\frac{Cos10t}{t}\right)$

a) 0 b) 1 c) 2 d) does not exist

Ans. d) does not exist

Q.8. If $L[f(t)] = \overline{f}(s)$ then $L\left[\int_0^t f(u)du\right]$

a) $\frac{\overline{f}(s)}{s}, s. > 0$ b) $\frac{\overline{f}(s)}{s}, s. < 0$ c) $\frac{\overline{f}(s)}{s}, s. = 0$ d) $\frac{\overline{f}(s)}{s}, s. \le 0$

Ans. a) $\frac{\overline{f}(s)}{s}, s. > 0$

Q.9.Laplace transform of unit step function

a) $\frac{e^{-as}}{s}$ b) $\frac{e^{-as}}{s+1}$ c) $\frac{e^{-as}}{s+2}$ d) $\frac{e^{-as}}{s+3}$

Ans. a) $\frac{e^{-as}}{s}$

Q.10. Value of $\int_0^\infty \left(\frac{e^{-1000t} - e^{-2000t}}{t} \right) dt$

a) log2 b) log 3 c) log 4 d) log 5

Ans. a) log2

Q.11. Find $L\left[\frac{1}{\sqrt{t}}\right]$

a) $\sqrt{\frac{\pi}{s}}, s > 0$ b) $\sqrt{\frac{\pi}{s+1}}$ c) $\sqrt{\frac{\pi}{s+2}}$ d) $\sqrt{\frac{\pi}{s+3}}$

Ans. a) $\sqrt{\frac{\pi}{s}}, s > 0$

Q.12. For existence of L.T. which is correct?

a) Sectionally continuous function b) Function of exponential order

c) Function of class A d) Function of inerrable

Ans. c) Function of class A

Q.13. Value of $L\left[e^{100t} Cos 200\, t\right]$

a) $\frac{s-100}{(s-100)^2 + 40000}$ b) $\frac{s+100}{(s+100)^2 - 40000}$ c) $\frac{s-50}{(s-50)^2 + 1000}$ d) $\frac{s+50}{(s+50)^2 - 1000}$

Ans. a) $\frac{s-100}{(s-100)^2 + 40000}$

Q.14.Lapace Transform is a ……

a) Linear transform b) binomial transform c) canonical transform d) none of these

Ans. a) Linear Transform

Q.15.Which function have Laplace Transform even it is not piecewise continuous in the range $t \geq 0$

a) $\frac{1}{\sqrt{t}}$ b) $\frac{1}{\sqrt{t^2}}$ c) $\frac{1}{\sqrt{t^3}}$ d) all of these

Ans. d) all of these

Q.16. If $L[f(t)] = \overline{f}(s)$ then $L\left(\frac{f(t)}{t}\right) = \int_s^\infty \overline{f}(u)du$, provided that

a) $Lim_{t\to\infty} \frac{f(t)}{t}$ *exist* b) $Lim_{t\to\infty} \frac{f(t)}{t}$ *does not exist* c) $Lim_{t\to\infty} \frac{f(t)}{t} = 1$ d) $Lim_{t\to\infty} \frac{f(t)}{t} = 0$

Ans. a) $Lim_{t\to\infty} \frac{f(t)}{t}$ *exist*

Q.17. which is the convolution property of L.T. ?

a) $f * g = \int_0^t f(u)g(t-u)du$ b) $f * g = \int_0^t f(u)g(t+u)du$

c) $f * g = \int_0^t f(t-u)g(t-u)du$ d) $f * g = \int_0^t f(u)g(t)du$

Ans. a) $f * g = \int_0^t f(u)g(t-u)du$

Q.18.Value of $L\left(\frac{1}{s^n}\right), n = 2,3,4....$

a) $\frac{t^n}{!(n-1)}$ b) $\frac{t^n}{!(n+1)}$ c) $\frac{t^n}{!(n-2)}$ d) $\frac{t^n}{!(n+2)}$

Ans. a) $\frac{t^n}{!(n-1)}$

Q.19. If $f(t)=\begin{cases}\sin t, & 0<t<\pi \\ -\sin t, & \pi<t<2\pi\end{cases}$ then fined L {f (t)}

a) $\dfrac{\int_0^{\pi} e^{-\pi s}\sin t\,dt}{1-e^{-s\pi}}$ b) $\dfrac{\int_0^{\pi} e^{\pi s}\sin t\,dt}{1+e^{-s\pi}}$ c) $\dfrac{\int_0^{\pi} e^{-\pi s}\sin t\,dt}{2-e^{-s\pi}}$ d) $\dfrac{\int_0^{\pi} e^{-\pi s}\sin t\,dt}{2+e^{-s\pi}}$

Ans. a) $\dfrac{\int_0^{\pi} e^{-\pi s}\sin t\,dt}{1-e^{-s\pi}}$

Q.20. If $[f(t)]=L^{-1}[\overline{f}(s)]$ then $L^{-1}\left(\dfrac{\overline{f(s)}}{s^n}\right)$

a) $\int_0^t\int_o^t\ldots..\int_o^t f(t)dt^n$ b) $\int_0^t\int_o^t\ldots..\int_o^t f(t+1)dt^n$ c) $\int_0^t\int_o^t\ldots..\int_o^t f(t+2)dt^n$ d) $\int_0^t\int_o^t\ldots..\int_o^t f(t+3)dt^n$

Ans. a) $\int_0^t\int_o^t\ldots..\int_o^t f(t)dt^n$

Q.21. Value of $L\left(\dfrac{\sin 100t}{t}\right)$

a) $\sin^{-1}\left(\dfrac{100}{s}\right)$ b) $\cos^{-1}\left(\dfrac{100}{s}\right)$ c) $\tan^{-1}\left(\dfrac{100}{s}\right)$ d) $\cot^{-1}\left(\dfrac{100}{s}\right)$

Ans. c) $\tan^{-1}\left(\dfrac{100}{s}\right)$

Q.22. If $L[f(t)]=\overline{f}(s)$, then $L[e^{400t}f(t)]$

a) $\overline{f}(s-400)$ b) $\overline{f}(s+400)$ c) $\overline{f}(s-200)$ d) $\overline{f}(s+200)$

Ans. a) $\overline{f}(s-400)$

Q.23.Value of $L(\cosh 200t)$

a) $\frac{s}{s^2-40000}$ b) $\frac{s}{s^2+40000}$ c) $\frac{s}{s^2-20000}$ d) $\frac{s}{s^2+20000}$

Ans. a) $\frac{s}{s^2-40000}$

Q.24.If $g(t)=\begin{cases}\overline{f}(t-1000), t>1000\\ 0, \quad t<1000\end{cases}$ then L{g(t)

a) $e^{10^2 s}\overline{f}(s)$ b) $e^{10s}\overline{f}(s)$ c) $e^{-10^2 s}\overline{f}(s)$ d) $e^{-10s}\overline{f}(s)$

Ans. a) $e^{10^2 s}\overline{f}(s)$

Q.25. If $f(t)=L^{-1}\{\overline{f}(s)\}$ then $L^{-1}\left(\overline{f}(50s+100)\right)$

a) $\frac{1}{50}e^{-2t}f\left(\frac{t}{50}\right)$ b) $\frac{1}{50}e^{-2t}f\left(\frac{t}{100}\right)$ c) $\frac{1}{100}e^{-2t}f\left(\frac{t}{50}\right)$ d) $\frac{1}{10}e^{-2t}f\left(\frac{t}{10}\right)$

Ans. a) $\frac{1}{50}e^{-2t}f\left(\frac{t}{50}\right)$