

Program: SE

Curriculum Scheme: Revised 2016

Examination: Second Year Semester III

Course Code: ETS301

Course Name: Applied Mathematics-III

Time: 1 hour

Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

Laplace , inv laplace,matrices,lin alg, calculus

Q1.	$L[f(t)] = F(s)$ then $L[t^n f(t)] =$
Option A:	$(-1)^n \frac{d^n}{ds^n}(F(s))$
Option B:	$(-1)^{n+1} \frac{d^n}{ds^n}(F(s))$
Option C:	$\frac{d^n}{ds^n}(F(s))$
Option D:	$(-1)^{n+1} \frac{d^{n+1}}{ds^{n+1}}(F(s))$
Q2.	Find $L[2t^3 + \cosh 4t]$
Option A:	$\frac{12}{s^4} + \frac{s}{s^2 + 16}$
Option B:	$\frac{48}{s^4} + \frac{s}{s^2 + 16}$
Option C:	$\frac{12}{s^4} + \frac{4}{s^2 + 16}$
Option D:	$\frac{12}{s^4} + \frac{s}{s^2 - 16}$
Q3.	Find $L^{-1}(2\tanh^{-1}s)$
Option A:	$\left(\frac{2}{t} \sinh 2t\right)$
Option B:	$\left(\frac{2}{t} \sinh t\right)$
Option C:	$\left(\frac{2}{t} \cosh 2t\right)$
Option D:	$\left(\frac{2}{t} \cosh t\right)$
Q4.	Find $L^{-1}\left(\frac{s+2}{s^2+4s+7}\right)$
Option A:	$e^{-t} \cdot \sin\sqrt{3}t$

Option B:	$e^{-3t} \cdot \cosh\sqrt{3}t$
Option C:	$e^{-2t} \cdot \cos\sqrt{3}t$
Option D:	$e^{-4t} \cdot \cos 6t$
Q5.	Find $L^{-1}\left(\frac{2s}{s^2+4}\right)$
Option A:	$4\cos t \cdot \sinh t$
Option B:	$2\cos t \cdot \cos ht$
Option C:	$\sin 3t \cdot \sinh t$
Option D:	$\sin t \cdot \sinh t$
Q6.	If $f(t) = \begin{cases} t + 1 & 0 \leq t \leq 2 \\ 3 & t > 2 \end{cases}$ then $L\{f(t)\} =$
Option A:	$\frac{1}{s} + \frac{1}{s^2}(1 - e^{-2s})$
Option B:	$\frac{3}{s} + \frac{1}{s^2}(1 - e^{-2s})$
Option C:	$\frac{1}{s} - \frac{1}{s^2}(1 - e^{-2s})$
Option D:	$\frac{1}{s^2}(1 - e^{-2s})$
Q7.	Find the Laplace Transform of $\int_0^t \sin 2u du$
Option A:	$\frac{2s}{s(s^2 + 4)}$
Option B:	$\frac{2}{s(s^2 + 4)}$
Option C:	$\frac{2}{(s^2 + 4)}$
Option D:	$\frac{2}{s(s^2 + 8)}$
Q8.	$L\{f(t)H(t - a)\} =$
Option A:	$e^{-as}L\{f(t - a)\}$
Option B:	$e^{-as}L\{f(t + a)\}$
Option C:	$e^{-s}L\{f(t + a)\}$
Option D:	$e^{-s}L\{f(t - a)\}$
Q9.	$L^{-1}\{e^{-as}\}$
Option A:	$\delta(t + a)$
Option B:	$e^{-as}\delta(t - a)$
Option C:	$\delta(t - a)$
Option D:	$e^{as}\delta(t + a)$

Q10.	Find $a_0$ of the function $f(x) = \sqrt{\frac{1-\cos x}{2}}$ in $(0, 2\pi)$
Option A:	$\frac{4}{\pi}$
Option B:	$\frac{2}{\pi}$
Option C:	$\frac{\pi}{4}$
Option D:	$\frac{\pi}{2}$
Q11.	Find $a_n$ if the function $f(x) = x - x^3$
Option A:	Finite value
Option B:	Infinite value
Option C:	Zero
Option D:	Cannot be found
Q12.	Find $b_n$ , when we have to find the half range sine series of the function $x^2$ in the interval 0 to 3.
Option A:	$-18 \frac{\cos(n\pi)}{n\pi}$
Option B:	$18 \frac{\cos(n\pi)}{n\pi}$
Option C:	$-18 \frac{\cos(n\pi/2)}{n\pi}$
Option D:	$18 \frac{\cos(n\pi)}{n\pi}$
Q13.	What is the for parseval's relation in fourier series expansion?
Option A:	$\int_{-l}^l (f(x))^2 dx = l \left[ \frac{a_0^2}{2} + \sum_{n=1}^{\infty} (a_n^2 + b_n^2) \right]$
Option B:	$\int_{-l}^l (f(x))^2 dx = l \left[ \frac{a_0^2}{2} + \sum_{n=1}^{\infty} (a_n^2) \right]$
Option C:	$\int_{-l}^l (f(x))^2 dx = \frac{l}{2} \left[ \frac{a_0^2}{2} + \sum_{n=1}^{\infty} (a_n^2 + b_n^2) \right]$
Option D:	$l \int_{-l}^l (f(x))^2 dx = \left[ \frac{a_0^2}{2} + \sum_{n=1}^{\infty} (a_n^2 + b_n^2) \right]$
Q14.	In the interval $(-L, L)$ , the $b_n$ co-efficient is
Option A:	$b_n = \frac{1}{L} \int_{-l}^l f(x) \sin\left(\frac{n\pi x}{L}\right) dx$
Option B:	$b_n = \frac{2}{\pi} \int_{-L}^L f(x) \sin(n\pi) dx$

Option C:	$b_n = \frac{1}{\pi} \int_{-L}^L f(x) \sin(n\pi x) dx$
Option D:	$\pi$
Q15.	Find a harmonic conjugate $v(x, y)$ of $u(x, y) = 2x - x^3 + 3xy^2$
Option A:	$v(x, y) = 2y - 3x^2y + y^3$
Option B:	$v(x, y) = 2 - 3x^2 + y^3$
Option C:	$v(x, y) = 2y - x^3y + 3xy^2$
Option D:	$v(x, y) = 2x - x^3 + y^3$
Q16.	The function $f(x + iy) = x^3 + ax^2y + bxy^2 + cy^3$ is analytic only if
Option A:	$a = 3i, b = -3, c = -i$
Option B:	$a = 3i, b = 3, c = -i$
Option C:	$a = 3i, b = -3, c = i$
Option D:	$a = -3i, b = -3, c = -i$
Q17.	If the real part of an analytic function $f(z)$ is $x^2 - y^2 - y$ , then the imaginary part is
Option A:	$2xy$
Option B:	$x^2 + 2xy$
Option C:	$2xy - y$
Option D:	$2xy + x$
Q18.	If $u$ and $v$ are harmonic function then $f(z) = u + iv$ is
Option A:	Need not be analytic function
Option B:	Analytic function
Option C:	Analytic function at $z=0$
Option D:	$u$ and $v$ satisfy Laplace equation .
Q19.	If $\varphi(x, y)$ and $\phi(x, y)$ are function with continuous second derivatives then $\varphi(x, y) + i\phi(x, y)$ can be expressed as an analytic function of $x + iy$ ( $i = \sqrt{-1}$ ) when
Option A:	$\frac{\partial \varphi}{\partial x} = -\frac{\partial \phi}{\partial x}, \frac{\partial \varphi}{\partial y} = -\frac{\partial \phi}{\partial y}$
Option B:	$\frac{\partial \varphi}{\partial y} = -\frac{\partial \phi}{\partial x}, \frac{\partial \varphi}{\partial x} = \frac{\partial \phi}{\partial y}$
Option C:	$\frac{\partial^2 \varphi}{\partial x^2} + \frac{\partial^2 \varphi}{\partial y^2} = \frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = 1$
Option D:	$\frac{\partial \varphi}{\partial x} + \frac{\partial \varphi}{\partial y} = \frac{\partial \phi}{\partial x} + \frac{\partial \phi}{\partial y} = 1$
Q20.	The Extremal of $\int_{x_1}^{x_2} \frac{y'^2}{x^2} dx$

Option A:	$y=c1(x)^3+c2$
Option B:	$y=c1(x)^2+c2x+c3$
Option C:	$y=c1x+c2$
Option D:	$y=c1(x)^4+c2$
Q21.	The directional derivative of $\phi$ in the direction of $\bar{a}$ is
Option A:	$\frac{\nabla\phi \cdot \bar{a}}{ \bar{a} }$
Option B:	$\frac{\nabla\phi \cdot 2\bar{a}}{ \bar{a} }$
Option C:	$\frac{\nabla\phi \cdot \bar{a}}{ \bar{a} ^2}$
Option D:	$\frac{\nabla\phi \cdot \bar{a}^2}{ \bar{a} }$
Q22.	The value of the Bessels Function $J_{-3/2}(x) =$
Option A:	$-\sqrt{\frac{2}{\pi x}} \left( \frac{\cos x}{x} \sin x \right)$
Option B:	$\sqrt{\frac{2}{\pi x}} \left( \frac{\cos x}{x} + \sin x \right)$
Option C:	$-\sqrt{\frac{2}{\pi x}} \left( \frac{\cos x}{x} + \sin x \right)$
Option D:	$-\sqrt{\frac{2}{\pi x}} \left( \frac{\cos x}{x} + \cos x \right)$
Q23.	Find a,b,c if $\bar{F} = (axy + bz^3)i + (3x^2 - cz)j + (3xz^2 - y)k$ is irrotational.
Option A:	a=6,b=1,c=-1
Option B:	a=4,b=4,c=-2
Option C:	a=6,b=1,c=1
Option D:	a=4,b=0,c=-1
Q24.	Evaluate $\int_A^B (ydx + xdy)$ along $y = x^2$ from $A(0,0)$ to $B(1,1)$
Option A:	1
Option B:	10
Option C:	5
Option D:	-10
Q25.	The Divergence and curl of $\bar{F} = (x^2 - y^2)i + 2xyj + (y^2 - xy)k$ is
Option A:	$Div\bar{F} = 0, curl\bar{F} = (2yx)i + (y)j + 4yk$

Option B:	$Div\bar{F} = 5xz + 2xy, curl\bar{F} = (2 + x)i + (y)j + 6zk$
Option C:	$Div\bar{F} = 4xy, curl\bar{F} = (2y)i + (y)j + 4yk$
Option D:	$Div\bar{F} = 4x, curl\bar{F} = (2y - x)i + (y)j + 4yk$