Program: SE-I.T. (SEM-III)

Curriculum Scheme: Revised 2012

Examination: Second Year Semester III

Course Code: **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 .

Q1.	$L[f(t)] = F(s)$ then $L[t^n f(t)] =$	Correct Answer option
Option A:	$(-1)^n \frac{d^n}{ds^n}(F(s))$	A
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 $L[2t^3 + cosh4t]$	
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:	$\frac{12}{s^4} + \frac{s}{s^2-16}$	D
Q3.	Find $L\{t\,e^{2t}\cos 3t\}$	
Option A:	$-\frac{(s-2)^2-9}{\left[(s-2)^2+9\right]^2}$	
Option B:	$\frac{(s-2)^2-9}{\left[(s-2)^2-9\right]^2}$	
Option C:	$\frac{(s-2)^2-9}{\left[(s-2)^2+9\right]^2}$	C

Option D:	$\frac{(s-2)^2+9}{[(s-2)^2+9]^2}$	
Q4.	Find $L^{-1}(2tanh^{-1}s)$	
Option A:	$\left(\frac{2}{t}sinh2t\right)$	
Option B:	$\left(\frac{2}{t}sinht\right)$	B
Option C:	$\left(\frac{2}{t}cosh2t\right)$	
Option D:	$\left(\frac{2}{t}cosht\right)$	
Q5.	Find $L^{-1}\left(\frac{s+2}{s^2+4s+7}\right)$	
Option A:	$e^{-t}.sin\sqrt{3}t$	
Option B:	$e^{-3t}.cosh\sqrt{3}t$	
Option C:	$e^{-2t}.cos\sqrt{3}t$	C
Option D:	$e^{-4t}.cos6t$	
Q6.	Find $L^{-1}\left(\frac{2s}{s^4+4}\right)$	
Option A:	$4cost.sinht$	
Option B:	$2cost.cosht$	
Option C:	$sin3t.sinht$	
Option D:	$sint.sinht$	D
Q7.	Find $L^{-1}\left\{\frac{s+4}{(s+2)^2+2^2}\right\}$	
Option A:	$e^{-2t}[\cos 2t-\sin 2t]$	
Option B:	$e^{2t}[\cos 2t+\sin 2t]$	
Option C:	$e^{-2t}[\cosh 2t+\sinh 2t]$	
Option D:	$e^{-2t}[\cos 2t+\sin 2t]$	D
Q8.	Find a_0 of the function $f(x)=\sqrt{\frac{1-cosx}{2}}$ in $(0,2\pi)$	
Option A:	$\frac{4}{\pi}$	A
Option B:	$\frac{2}{\pi}$	
Option C:	$\frac{\pi}{4}$	
Option D:	$\frac{\pi}{2}$	
Q9.	Find a_n if the function $f(x)=x-x^3$	

Option A:	Finite value	
Option B:	Infinite value	
Option C:	Zero	C
Option D:	Cannot be found	
Q10.	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:	$-18\frac{\cos(n\pi)}{n\pi}$	A
Option B:	$18\frac{\cos(n\pi)}{n\pi}$	
Option C:	$-18\frac{\cos(n\pi/2)}{n\pi}$	
Option D:	$18\frac{\cos(n\pi)}{n\pi}$	
Q11.	What is the for parseval's relation in fourier series expansion?	
Option A:	$\int_{-l}^{l}(f(x))^2\,dx = l\left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}\left({a_n}^2 + {b_n}^2\right)\right]$	A
Option B:	$\int_{-l}^{l}(f(x))^2\,dx = l\left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}\left({a_n}^2\right)\right]$	
Option C:	$\int_{-l}^{l}(f(x))^2\,dx = \frac{l}{2}\left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}\left({a_n}^2 + {b_n}^2\right)\right]$	
Option D:	$l\int_{-l}^{l}(f(x))^2\,dx = \left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}\left({a_n}^2 + {b_n}^2\right)\right]$	
Q12.	In the interval$(-L, L)$, the b_n co-efficient is	
Option A:	$b_n = \frac{1}{L}\int_{-l}^{l} f(x)\sin\left(\frac{n\pi x}{L}\right)dx$	A
Option B:	$b_n = \frac{2}{\pi}\int_{-L}^{L} f(x)\sin(n\pi)\,dx$	
Option C:	$b_n = \frac{1}{\pi}\int_{-L}^{L} f(x)\sin(n\pi)\,dx$	
Option D:	π	
Q13.	Find a harmonic conjugate $v(x,y)$ of $u(x,y) = 2x - x^3 + 3xy^2$	
Option A:	$v(x,y) = 2y - 3x^2y + y^3$	A
Option B:	$v(x,y) = 2 - 3x^2 + y^3$	
Option C:	$v(x,y) = 2y - x^3y + 3xy^2$	
Option D:	$v(x,y) = 2x - x^3 + y^3$	
Q14.	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:	$a = 3i\,, b = -3\,, c = i$	C
Option D:	$a = -3i\,, b = -3\,, c = -i$	
Q15.	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:	$2xy + x$	D
Q16.	If u and v are harmonic function then $f(z) = u + iv$ is	
Option A:	Need not be analytic function	
Option B:	Analytic function	B
Option C:	Analytic function at z=0	
Option D:	Analytic function at z=i	
Q17.	If $\varphi(x,y)$ and $\emptyset(x,y)$ are function with continuous second derivatives then $\varphi(x,y) + i\emptyset(x,y)$ can be expressed as an analytic function of $x + iy$ $\left(i = \sqrt{-1}\right)$ when	
Option A:	$\frac{\partial\varphi}{\partial x} = -\frac{\partial\emptyset}{\partial x}, \frac{\partial\varphi}{\partial y} = -\frac{\partial\emptyset}{\partial y}$	
Option B:	$\frac{\partial\varphi}{\partial y} = -\frac{\partial\emptyset}{\partial x}, \frac{\partial\varphi}{\partial x} = \frac{\partial\emptyset}{\partial y}$	B
Option C:	$\frac{\partial^2\varphi}{\partial x^2} + \frac{\partial^2\varphi}{\partial y^2} = \frac{\partial^2\emptyset}{\partial x^2} + \frac{\partial^2\emptyset}{\partial y^2} = 1$	
Option D:	$\frac{\partial\varphi}{\partial x} + \frac{\partial\varphi}{\partial y} = \frac{\partial\emptyset}{\partial x} + \frac{\partial\emptyset}{\partial y} = 1$	
Q18.	What is the Z-transform of the $f(k) = a^k$, $k \geq 0$	
Option A:	$\frac{z}{z-a}, \quad ROC: \lvert z\rvert > \lvert a\rvert$	A
Option B:	$\frac{z}{z-a^{-1}}, \quad ROC: \lvert z\rvert > \lvert a\rvert$	
Option C:	$\frac{z}{z-1}, \quad ROC: \lvert z\rvert > \lvert a\rvert$	
Option D:	$\frac{1}{z-a}, \quad ROC: \lvert z\rvert > \lvert a\rvert$	
Q19.	Find the Z-transform of the $f(k) = k^2$, $k \geq 0$	
Option A:	$\frac{(z+1)}{(z-1)^3}, ROC: \lvert z\rvert > 1$	A
Option B:	$\frac{z(z+1)}{(z-1)^3}, ROC: \lvert z\rvert > 1$	

Option C:	$\frac{z}{(z-1)^3}$, $ROC: \lvert z \rvert > 1$	
Option D:	$\frac{z(z+1)}{(z-1)}$, $ROC: \lvert z \rvert > 1$	
Q20.	The region of convergence of the Z-transform of $3(2^k) - 4(3^k)$, $k \geq 0$	
Option A:	$ROC : \lvert z \rvert > 3$	A
Option B:	$ROC : \lvert z \rvert > 2$	
Option C:	$ROC : \lvert z \rvert > 0$	
Option D:	$ROC : \lvert z \rvert > 1$	
Q21.	If $\emptyset = xz^2 - 5yz + xz$, then the gradient of $\emptyset$ $i.e$ $\nabla\emptyset$ at (1,-1,2) is	
Option A:	6i-10j+10k	A
Option B:	7i-11j+12k	
Option C:	6i-11j+9k	
Option D:	8i-12j+6k	
Q22.	The directional derivative of $\emptyset = xy^2 + yz^3$ at point (2,-1,1) in the direction of vector i+2j+2k is	
Option A:	$\frac{11}{3}$	
Option B:	$-\frac{11}{3}$	B
Option C:	$\frac{10}{3}$	
Option D:	$-\frac{10}{3}$	
Q23.	A field is said to be conservative or irrotational if	
Option A:	$curl\bar{F} = 0$	A
Option B:	$curl\bar{F} = 1$	
Option C:	$curl\bar{F} \neq 0$	
Option D:	None of these	
Q24.	By Green's Theorem the value of $\int_c (e^{-x}sinydx + e^{-x}cosydy)$ where C is a rectangle whose vertices are (0,0), $(\pi, 0)$, $\left(\pi, \frac{\pi}{2}\right)$, $(0, \frac{\pi}{2})$ is	
Option A:	$e^{-\pi} - 1$	
Option B:	$2(e^{\pi} - 1)$	
Option C:	$2(e^{-\pi} - 1)$	C
Option D:	$(e^{\pi} - 1)$	

Q25.	If $\bar{F} = 4xzi - y^2j + yzk$ and C is the area in the plane z=0 bounded by x=0, y=0 and $x^2 + y^2 = 1$ Then by Stoke's Theorem , $\int_C \bar{F}\, d\bar{r} =$	
Option A:	$\frac{1}{2}$	
Option B:	0	B
Option C:	$\frac{5}{7}$	
Option D:	$\frac{11}{6}$	