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

Curriculum Scheme: Revised 2019

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 $L^{-1}(2tanh^{-1}s)$	
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:	$\left(\frac{2}{t}cosht\right)$	
Q4.	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:	$e^{-4t}.cos6t$	
Q5.	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
Q6.	Find $L\{te^{2t}\cos 3t\}$	
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:	$\frac{(s-2)^2+9}{\left[(s-2)^2+9\right]^2}$	
Q7.	If $L\{f(t)\}=\frac{2}{s^3}e^{-s}$ Solve L { f (2t) }	
Option A:	$\frac{8}{s^3}e^{\frac{-s}{2}}$	A
Option B:	$\frac{1}{2}\frac{(-8)}{s^3}e^{\frac{-s}{2}}$	
Option C:	$\frac{-8}{s^3}e^{\frac{-s}{2}}$	
Option D:	$\frac{1}{2}\frac{8}{s^3}e^{\frac{-s}{2}}$	
Q8.	Find $L^{-1}\left\{\frac{s+4}{(s+2)^2+2^2}\right\}$	
Option A:	$e^{-2t}\left[\cos 2t-\sin 2t\right]$	
Option B:	$e^{2t}\left[\cos 2t+\sin 2t\right]$	
Option C:	$e^{-2t}\left[\cosh 2t+\sinh 2t\right]$	
Option D:	$e^{-2t}\left[\cos 2t+\sin 2t\right]$	D

Q9.	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:	$\frac{\pi}{2}$	
Q10.	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	
Q11.	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$\frac{\cos(n\pi)}{n\pi}$	
Q12.	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:	$\int_{-l}^{l}(f(x))^2\,dx = l\left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}({a_n}^2)\right]$	
Option C:	$\int_{-l}^{l}(f(x))^2\,dx = \frac{l}{2}\left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}\left({a_n}^2 + {b_n}^2\right)\right]$	
Option D:	$l\int_{-l}^{l}(f(x))^2\,dx = \left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}\left({a_n}^2 + {b_n}^2\right)\right]$	
Q13.	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	
Q14.	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:	$v(x,y) = 2x - x^3 + y^3$	
Q15.	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:	$a = -3i\,, b = -3\,, c = -i$	
Q16.	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
Q17.	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	
Q18.	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:	$\frac{\partial\varphi}{\partial x} + \frac{\partial\varphi}{\partial y} = \frac{\partial\emptyset}{\partial x} + \frac{\partial\emptyset}{\partial y} = 1$	
Q19.	What is the Z-transform of the $f(k) = a^k\,, k \geq 0$	

Option A:	$\frac{z}{z-a}$, $ROC: \|z\| > \|a\|$	A
Option B:	$\frac{z}{z-a^{-1}}$, $ROC: \|z\| > \|a\|$	
Option C:	$\frac{z}{z-1}$, $ROC: \|z\| > \|a\|$	
Option D:	$\frac{1}{z-a}$, $ROC: \|z\| > \|a\|$	
Q20.	The rank correlation coefficient between x&y is given by	
Option A:	$R = 1 - + \frac{6\sum d^2}{n(n^2-1)}$	
Option B:	$R = 1 - \frac{6\sum d^2}{n(n^2+1)}$	
Option C:	$R = 1 - \frac{6\sum d^2}{n(n^2-1)}$	C
Option D:	None of these	
Q21.	From line of regression to find y for given x, we use	
Option A:	Regression of y on x	A
Option B:	Regression of x on y	
Option C:	Any one of these	
Option D:	None of these	
Q22.	If $2x+3y+8=0$ is regression of y on x then find b_{yx}	
Option A:	-3/2	
Option B:	2/3	
Option C:	-2/3	C
Option D:	3/2	
Q23.	If the following gives the p.d.f. X | 1 | 2 | 3 | 4 P(x) | 4k | 3k | 2k | K Find k	
Option A:	1	
Option B:	0.5	
Option C:	0.2	
Option D:	0.1	D
Q24.	A random variable x has the following probability function.	

	<table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>P(x)</td><td>$1/6$</td><td>$1/2$</td><td>$3/10$</td><td>$1/30$</td></tr></table> Find the expectation	
Option A:	2/5	
Option B:	4/5	
Option C:	6/5	C
Option D:	3/5	
Q25.	Find k, if x is a continuous random variable with p.d.f. $f(x)=k(x-x^3) \quad 0 \le x < 1$ $=0 \quad$ *otherwise*	
Option A:	1/4	
Option B:	4	B
Option C:	3	
Option D:	2	