Curriculum Scheme: Revised 2012

Examination: Second Year Semester III

Course Code: CSC301 **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.	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:	$v(x,y) = 2x - x^3 + y^3$
Q2.	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:	$a = -3i\ , b = -3\ , c = -i$
Q3.	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:	$2xy + x$
Q4.	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:	Analytic function at z=i
Q5.	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:	$\frac{\partial\varphi}{\partial y} = -\frac{\partial\emptyset}{\partial x}\ , \frac{\partial\varphi}{\partial x} = \frac{\partial\emptyset}{\partial y}$
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:	$\frac{\partial\varphi}{\partial x}+\frac{\partial\varphi}{\partial y}=\frac{\partial\emptyset}{\partial x}+\frac{\partial\emptyset}{\partial y}=1$
Q6.	If $f(z)=x+ay+i(bx+cy)$ is analytic then a , b , c equals to
Option A:	c =1 and a = - b
Option B:	a =1 and c = - b
Option C:	b =1 and a = - c
Option D:	a = b = c = 1
Q7.	$L[f(t)]=F(s)$ 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:	$(-1)^{n+1}\frac{d^{n+1}}{ds^{n+1}}(F(s))$
Q8.	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:	$\frac{12}{s^4}+\frac{s}{s^2-16}$
Q9.	Find $L^{-1}(2tanh^{-1}s)$
Option A:	$\left(\frac{2}{t}sinh2t\right)$
Option B:	$\left(\frac{2}{t}sinht\right)$
Option C:	$\left(\frac{2}{t}cosh2t\right)$
Option D:	$\left(\frac{2}{t}cosht\right)$
Q10.	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:	$e^{-2t}.cos\sqrt{3}t$

Option D:	$e^{-4t}.cos6t$
Q11.	Find $L^{-1}\left(\frac{2s}{s^4+4}\right)$
Option A:	$4cost.sinht$
Option B:	$2cost.cosht$
Option C:	$sin3t.sinht$
Option D:	$sint.sinht$
Q12.	Find $L[e^{at}f(t)]$, if $L[f(t)]$=F(s)
Option A:	$\frac{1}{s}F\left(\frac{s}{a}\right)$
Option B:	$\frac{1}{a}F\left(\frac{s}{a}\right)$
Option C:	$\frac{1}{s}F\left(\frac{a}{s}\right)$
Option D:	$\frac{1}{a}F\left(\frac{a}{s}\right)$
Q13.	Find a_0 of the function $f(x) = \sqrt{\frac{1-cosx}{2}}$ in $(0,2\pi)$
Option A:	$\frac{4}{\pi}$
Option B:	$\frac{2}{\pi}$
Option C:	$\frac{\pi}{4}$
Option D:	$\frac{\pi}{2}$
Q14.	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
Q15.	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:	$18\frac{\cos(n\pi)}{n\pi}$
Q16.	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:	$$l\int_{-l}^{l}(f(x))^2\,dx = \left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}({a_n}^2 + {b_n}^2)\right]$$
Q17.	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:	$$b_n = \frac{1}{\pi}\int_{-L}^{L} f(x)\sin(n\pi)\,dx$$
Option D:	π
Q18.	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
Option B:	7i-11j+12k
Option C:	6i-11j+9k
Option D:	8i-12j+6k
Q19.	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:	$-\frac{11}{3}$
Option C:	$\frac{10}{3}$
Option D:	$-\frac{10}{3}$
Q20.	A field is said to be conservative or irrotational if
Option A:	$curl\bar{F} = 0$
Option B:	$curl\bar{F} = 1$
Option C:	$curl\bar{F} \neq 0$
Option D:	None of these

Q21.	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:	$2(e^{-\pi} - 1)$
Option D:	$(e^{\pi} - 1)$
Q22.	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
Option C:	$\frac{5}{7}$
Option D:	$\frac{11}{6}$
Q23.	What is the Z-transform of the $f(k) = a^k \ ,k \geq 0$
Option A:	$\frac{z}{z-a}, \quad ROC: \lvert z\rvert > \lvert a\rvert$
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:	$\frac{1}{z-a}, \quad ROC: \lvert z\rvert > \lvert a\rvert$
Q24.	Find the Z-transform of the $f(k) = k^2 \ ,k \geq 0$
Option A:	$\frac{(z+1)}{(z-1)^3}, ROC: \lvert z\rvert > 1$
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:	$\frac{z(z+1)}{(z-1)}, ROC: \lvert z\rvert > 1$
Q25.	The region of convergence of the Z-transform of $3(2^k) - 4(3^k) \ ,k \geq 0$
Option A:	$ROC : \lvert z\rvert > 3$
Option B:	$ROC : \lvert z\rvert > 2$
Option C:	$ROC : \lvert z\rvert > 0$
Option D:	$ROC : \lvert z\rvert > 1$