University of Mumbai

Examination 2020 under cluster ___ (Lead College Shortname)

Program: EXTC Engineering
Curriculum Scheme: Rev 2012
Examination: Second Year Semester III
Course Code: ETS 301 and Course Name: Applied Mathematics III

Time: 1 hour Max. Marks: 50

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

Q1.	$L(e^{2t}cos\omega t) = $ ___________
Option A:	$\frac{s}{s^2+\omega^2}$
Option B:	$\frac{(s-2)}{(S-2)^2+\omega^2}$
Option C:	$\frac{(s+2)}{(S+2)^2+\omega^2}$
Option D:	$\frac{2}{(S+\omega)^2+2^2}$
Q2.	What is the fixed point of $w=\frac{5-4z}{4z-3}$
Option A:	$\frac{5}{4},-1$
Option B:	$\frac{-5}{4},1$
Option C:	$-5,4$
Option D:	$5,-4$
Q3.	Find directional derivative of $\phi = x^2+y^2+z^2$ in the direction of $i-2j+2k$ at point (1,2,3).
Option A:	10/3
Option B:	2/3
Option C:	-2
Option D:	2
Q4.	Fourier coefficient a_0 $of\ f(x) = 2x-1\ in\ (0,3)$
Option A:	3
Option B:	$\frac{1}{2}$
Option C:	1
Option D:	2
Q5.	If $\bar{F} = (3x+2y)i + (5y-4z)j + (az+x)k$ is solenoidal, find a
Option A:	-2
Option B:	8
Option C:	-8

Option D:	2
Q6.	Find constants a, b if $f(z)=\left(3x^2y+2x^2+ay^3-2y^2\right)+i\left(bxy-x^3+3xy^2\right)$ is analytic.
Option A:	$a=1, b=4$
Option B:	$a=4, b=1$
Option C:	$a=-1, b=4$
Option D:	$a=-1, b=-4$
Q7.	The function $f_3(x)=ax^2-\frac{1}{2}$ is orthogonal to functions $f_1(x)=1$ and $f_2(x)=x$ in the interval (-1, 1). The value of a will be
Option A:	3
Option B:	$\frac{3}{2}$
Option C:	0
Option D:	None of these.
Q8.	Find the analytic function whose real part is $x^2-y^2+3y-2x+3$.
Option A:	$f(z)=z^2-2z+3zi$
Option B:	$f(z)=z^2-2z-3zi$
Option C:	$f(z)=z^2+3z-2zi$
Option D:	$f(z)=z^2-3z-3zi+4$
Q9.	$L(\int_0^t \int_0^t \int_0^t \sin u\, du^3)=$__________
Option A:	$\frac{1}{s^3(s^2+1)}$
Option B:	$\frac{s^2}{(s^2+1)}$
Option C:	$\frac{s}{(S+1)^2}$
Option D:	$\frac{1}{s^2(s^2+1)}$
Q10.	Find value of b_n in the Fourier expansion of function $f(x)=\left(2-x^2\right)$ in the interval $(0,2)$.
Option A:	$\frac{2}{n\pi}+\frac{2}{n^3\pi^3}$
Option B:	$\frac{2}{n\pi}$

Option C:	$\frac{4}{n\pi}$
Option D:	$\frac{4}{n^3\pi^3}$
Q11.	Find the value of $L^{-1}[\log(s^2-7s+10)]$.
Option A:	$-\frac{1}{t}(e^{5t}-e^{-2t})$
Option B:	$\frac{1}{t}(e^{5t}+e^{2t})$
Option C:	$-\frac{1}{t}(e^{2t}-e^{5t})$
Option D:	$-\frac{1}{t}(e^{5t}+e^{2t})$
Q12.	Work done in moving a particles in a conservative field under the force $\bar{F}=(2xy+z^3)i+(x^2)j+(3z^2x)k$ from the point (1,-2,1) to (3,1,4) is
Option A:	200 units
Option B:	204 units
Option C:	202 units
Option D:	206 units
Q13.	Evaluate $L^{-1}\left[\frac{1}{(S-2)^4}\right]$.
Option A:	$e^{2t}\frac{t^3}{3!}$
Option B:	$e^{2t}\frac{t^5}{\lceil 5}$
Option C:	$e^{-2t}\frac{t^4}{4!}$
Option D:	$e^{-2t}\frac{t^5}{5!}$
Q14.	Use Stoke's Theorem to evaluate $\int_C \bar{F}.d\bar{r}$ where $\bar{F}=x^2i+xyj$ and C is boundary of rectangle $x=0, x=1, y=0, y=2$
Option A:	½
Option B:	2
Option C:	4
Option D:	6
Q15.	Using Green's Theorem evaluate $\oint(x^2-y)dx+(2y^2+x)dy$ around the boundary of the region $y=x^2, y=x$
Option A:	1/3
Option B:	3
Option C:	1/6
Option D:	-1/3

Q16.	If $f(z) = r^3 cosk\theta + ir^k sink\theta$ is analytic then k=______.
Option A:	-4
Option B:	4
Option C:	-3
Option D:	3
Q17.	Evaluate $L^{-1}\left[\frac{1}{s(s-3)}\right]$.
Option A:	$\frac{1}{3} + \frac{1}{3} e^{3t}$
Option B:	$\frac{-1}{3} e^{3t} + \frac{1}{3} e^{3t}$
Option C:	$\frac{1}{3}(e^{3t} - 1)$
Option D:	$\frac{1}{3}(1 - e^{3t})$
Q18.	$f(x) = \|x\|$ in $(-\pi, \pi)$ then Fourier Coefficient a_n=____
Option A:	$\frac{[(-1)^n - 1]}{n^2\pi}$
Option B:	$\frac{2[(-1)^n - 1]}{n^2\pi}$
Option C:	0
Option D:	$\frac{2[(-1)^n + 1]}{n^2\pi}$
Q19.	If S is any closed surface enclosing a volume V and $\bar{A} = (ax)i + (by)j + (cz)k$ then $\iint_S \bar{A}.\hat{n}ds$ is
Option A:	$(a + b + c)V$
Option B:	$a + b + c$
Option C:	$abcV$
Option D:	abc
Q20.	In half range cosine series of $f(x) = x\ in\ (0,2)$ value of b_n is
Option A:	1
Option B:	$\frac{4[(-1)^n - 1]}{n^2\pi^2}$
Option C:	$\frac{4[(-1)^n + 1]}{n^2\pi^2}$
Option D:	0
Q21.	Select the correct relation.
Option A:	$J_n'(x) = \frac{n}{x} J_n(x) + J_{n-1}(x)$

Option B:	$J_n'(x) = -\frac{n}{x} J_n(x) - J_{n-1}(x)$
Option C:	$J_n'(x) = -\frac{n}{x} J_n(x) + J_{n-1}(x)$
Option D:	$J_n'(x) = \frac{n}{x} J_n(x) - J_{n-1}(x)$
Q22.	$\int_0^{\infty} e^{-t}\, erf 3\sqrt{t} dt =$ _____
Option A:	$\frac{3}{\sqrt{10}}$
Option B:	$\frac{1}{\sqrt{5}}$
Option C:	$\frac{9}{\sqrt{10}}$
Option D:	$\frac{2}{\sqrt{5}}$
Q23.	$\int J_3(x)\ dx =$ ______
Option A:	$-J_2(x) - \frac{2}{x} J_1(x)$
Option B:	$-J_2(x) + \frac{2}{x} J_1(x)$
Option C:	$J_2(x) - \frac{2}{x} J_1(x)$
Option D:	$J_2(x) + \frac{2}{x} J_1(x)$
Q24.	$J_{-\frac{3}{2}}(x) =$ _____
Option A:	$\sqrt{\frac{2\pi}{x}} \left(sinx + \frac{cosx}{x}\right)$
Option B:	$\sqrt{\frac{2\pi}{x}} \left(sinx - \frac{cosx}{x}\right)$
Option C:	$-\sqrt{\frac{2\pi}{x}} \left(sinx + \frac{cosx}{x}\right)$
Option D:	$-\sqrt{\frac{2\pi}{x}} \left(sinx - \frac{cosx}{x}\right)$
Q25.	Find the image of interior of circle $\lvert z \rvert = 1$ under the transformation $W = \frac{1}{z}$
Option A:	interior of circle $\lvert w \rvert = 1$
Option B:	Exterior of circle $\lvert w \rvert = 1$

Option C:	$\|w\| = 1$
Option D:	real axis in W- plane