Program: SE (EXTC)

Curriculum Scheme: Revised 2019 'C' scheme

Examination: Second Year Semester III

Course Code: ELC301 **Course Name: Engineering Mathematics-III**

Time: 2 hours Max. Marks: 80

==

For the students:- All the Questions are compulsory .

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry 2 marks each**
Q1.	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:	$\frac{12}{s^4} + \frac{s}{s^2-16}$
2.	$L(cosh2t.cos2t)$
Option A:	$\frac{s^2}{(s^4+64)}$
Option B:	$\frac{s^3}{(s^4+24)}$
Option C:	$\frac{s^3}{(s^4-64)}$
Option D:	$\frac{s^3}{(s^4+64)}$

3.	$L(tsinat)$
Option A:	$\frac{2as}{(s^2+a^2)^2}$
Option B:	$-\frac{2as}{(s^2+a^2)^2}$
Option C:	$\frac{2as}{(s^2-a^2)^2}$
Option D:	$-\frac{2as}{(s^2-a^2)^2}$
4.	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:	$e^{-4t}.cos6t$
5.	$L[t^2H(t-2)]$=
Option A:	$e^{-2s}\left(\frac{2}{s^3}+\frac{4}{s^2}+\frac{4}{s}\right)$
Option B:	$e^{-2s}\left(\frac{2}{s^3}-\frac{4}{s^2}+\frac{9}{s}\right)$
Option C:	$e^{-2s}\left(\frac{2}{s^3}-\frac{6}{s^2}-\frac{4}{s}\right)$
Option D:	$e^{-2s}\left(\frac{2}{s^3}+\frac{4}{s^2}-\frac{9}{s}\right)$

6.	$L^{-1}\left(\frac{s}{(s-2)^6}\right)$
Option A:	$e^{2t}\left(\frac{t^4}{4!}+2\frac{t^5}{5!}\right)$
Option B:	$e^{2t}\left(\frac{t^4}{4!}-2\frac{t^5}{5!}\right)$
Option C:	$e^{2t}\left(\frac{t^3}{4!}+4\frac{t^5}{5!}\right)$
Option D:	$e^{2t}\left(\frac{t^4}{5!}+6\frac{t^5}{5!}\right)$
7.	At the point of discontinuity 'c' the value of the function $f(x)$ at 'c' is
Option A:	$\frac{1}{2}\left[\lim_{x\to c^-} f(x) - \lim_{x\to c^+} f(x)\right]$
Option B:	$\frac{1}{2}\left[\lim_{x\to c^-} f(x) + \lim_{x\to c^+} f(x)\right]$
Option C:	$\frac{1}{2}\left[\lim_{x\to 0^-} f(x) + \lim_{x\to 0^+} f(x)\right]$
Option D:	$\left[\lim_{x\to c^-} f(x) + \lim_{x\to c^+} f(x)\right]$
8.	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:	$\frac{\pi}{2}$
9.	The fourier series expansion of the function $f(x)$ in the interval $(-\pi,\pi)$
Option A:	$f(x) = a_0 + \sum_{n=0}^{\infty}(a_n cosnx + b_n sinnx)$
Option B:	$f(x) = a_0 + \sum_{n=1}^{\infty}(a_n cosn\pi x + b_n sinn\pi x)$
Option C:	$f(x) = a_0 + \sum_{n=1}^{\infty}(a_n cosnx + b_n sinnx)$
Option D:	$f(x) = a_0 + \sum_{n=1}^{\infty}\left(a_n cos\frac{n\pi x}{l} + b_n sin\frac{n\pi x}{l}\right)$
10.	Find b_n $of\ the\ function$ $f(x) = x^2$in $(0,2\pi)$
Option A:	$b_n = -\frac{1}{n^2}$
Option B:	$b_n = \frac{1}{n^2}$
Option C:	$b_n = \frac{4\pi}{n}$
Option D:	$b_n = 2\pi$
11.	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:	$Div\bar{F} = 4x\ , curl\bar{F} = (2y - x)i + (y)j + 4yk$
12.	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
13.	The scalar potential $\emptyset$ of $\bar{F} = (y^2cosx + z^3)i + (2ysinx - 4)j + (3xz^2 + 2)k\ \ is$
Option A:	$\emptyset = y^2sinx + z^3x - 4ycosx + 2z$+C
Option B:	$\emptyset = y^2sinx + z^3xsinx - 4y + 2z$+C
Option C:	$\emptyset = y^2sinx + z^3x - 4y + 2z$+C
Option D:	$\emptyset = y^2cosx + z^3x - y + 2z$+C
14.	Find the work done when a force $\bar{F} = (x^2 - y^2 + x)i - (2xy + y)j$ moves a particle in the xy plane from (0,0) to (1,1) along the parabola $y^2 = x$
Option A:	$\frac{-2}{3}$
Option B:	$\frac{2}{3}$
Option C:	$\frac{-5}{3}$
Option D:	0

15.	If P and Q are the functions of x and y with continuous patrial derivatives over the closed region R bounded by a curve C then $\int_c (Pdx + Qdy)$ along the curve C is :
Option A:	$\iint_R \left(2\frac{\partial Q}{\partial x} + 3\frac{\partial P}{\partial y}\right) dxdy$
Option B:	$\iint_R \left(\frac{\partial Q}{\partial x} * \frac{\partial P}{\partial y}\right) dxd$
Option C:	$\iint_R \left(\frac{\partial Q}{\partial x} + \frac{\partial P}{\partial y}\right) dxdy$
Option D:	$\iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right) dxdy$
16.	The fixed poins of $w = \frac{z-1}{z+1}$ are
Option A:	$z = i, z = -i$
Option B:	$z = i, z = 0$
Option C:	$z = -1, z = -i$
Option D:	$z = 1, z = -1$
17.	Find the constants $a, b, c, d,$ if $f(z) = (x^2 + 2axy + by^2) + i(cx^2 + 2dxy + y^2)$ is analytic
Option A:	$a = 1, b = 1, c = 0, d = 1,$
Option B:	$a = 1, b = -1, c = -1, d = 1,$
Option C:	$a = 0, b = -2, c = -1, d = 1,$
Option D:	$a = 1, b = -1, c = -3, d = 1,$

18.	Find the analytic function analytic function $f(z)$ whose real part is $e^{2x}(xcos2y - ysin2y)$
Option A:	$f(z) = ze^{z} + c$
Option B:	$f(z) = z^2e^{2z} + z + c$
Option C:	$f(z) = ze^{2z} + c$
Option D:	$f(z) = z^2e^{2z} + c$
19.	Consider the two functions $u_1(x, y) = x^3 - 3x^2y - y^2$ $u_2(x, y) = e^x cosy + x^3 - 3xy^2$ which of statement is correct
Option A:	$u_1(x, y)$ *and* $u_2(x, y)$ both are harmonic
Option B:	$u_1(x, y)$ is not harmonic but $u_2(x, y)$ is harmonic
Option C:	$u_2(x, y)$ is not harmonic but $u_1(x, y)$ is harmonic
Option D:	$u_1(x, y)$ *and* $u_2(x, y)$ both are not harmonic
20.	The image of real axis in the Z-Plane under the transformation $w = \left(\frac{z-i}{z+i}\right)$ is
Option A:	$\lvert w \rvert = 2$
Option B:	$\lvert w \rvert = 1$
Option C:	$x + y = 1$
Option D:	$x^2 + y^2 = 1$

Q2 (20 Marks Each)	**Solve any Four out of Six** **5 marks each**
A	Find the Laplace Transform of $\frac{cos2tsint}{e^t}$
B	Find the Inverse Laplace using Convolution Theorem $$\frac{1}{(s-2)^4(s+3)}$$
C	Find fourier series for $f(x) = \begin{cases} x & 0 < x \leq \pi \\ 2\pi - x & \pi \leq x \leq 2\pi \end{cases}$ in $(0,2\pi)$
D	Show that $u = y^3 - 3x^2y$ is a harmonic function . Find its harmonic conjugate and corresponding analytic function .
E	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ find A^{50}.
F	Evaluate by Stokes theorem $\int_c (xydx + xy^2dy)$ where Cis the square in the xy-plane with vertices (1,0),(0,1) (-1,0)and (0,-1).
Q3. (20 Marks Each)	**Solve any Four out of Six** **5 marks each**
A	Find using Laplace Transform $\int_0^\infty \frac{e^{-t}sin^2t}{t}\, dt$
B	Solve using Laplace Transform $\frac{dy}{dx} + 3y = 2 + e^{-t}, y = 1\ at\ t = 0$
C	Find half range cosine series for $f(x) = x \quad 0 < x < 2$ using Parseval's Identity deduce that

	$\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + -$
D	Find the analytic function $f(z) = u + iv$ where $$u - v = \frac{cosx+sinx-e^{-y}}{2cosx-e^{y}-e^{-y}}$$
E	Verify Cayley Hamilton Theorem and hence compute the matrix represented by $$A^9 - 6A^8 + 10A^7 - 3A^6 + A + I \quad \text{where} \quad A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 3 & 1 \\ 1 & 0 & 2 \end{bmatrix}$$
F	Evaluate by Greens theorem $\int_c (e^{-x} sinydx + e^{-x} cosydy)$ where C is the rectangle whose vertices are $(0,0)(\pi,0)\left(\pi,\frac{\pi}{2}\right)\left(0,\frac{\pi}{2}\right)$

NOTE: There are three options for subjective/descriptive questions

Option 1

Q2 and Q3. **(20 Marks Each)**	**Solve any Four out of Six 5 marks each**
A	
B	
C	
D	
E	
F	

OR
Option 2

Q2 and Q3.	**Solve any Two Questions out of Three 10 marks each**

(20 Marks Each)	
A	
B	
C	

OR

Option 3

Q2 and Q3. (20 Marks Each)	
A	**Solve any Two** **5 marks each**
i.	
ii.	
iii.	
B	**Solve any One** **10 marks each**
i.	
ii.	

****************END*******************