Program: **COMPUTER Engineering**
Curriculum Scheme: Rev2019
Examination: SE Semester III
Course Code: CSC301 and Course Name: Engineering Mathematics-III
Time: 2 hour Max. Marks: 80
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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	$L[f(t)] = F(s)$ 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:	$(-1)^{n+1} \frac{d^{n+1}}{ds^{n+1}}(F(s))$
2.	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:	$\frac{12}{s^4} + \frac{s}{s^2-16}$
3.	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:	$\left(\frac{2}{t}cosht\right)$
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.	Find $L^{-1}\left(\frac{2s}{s^4+4}\right)$

Option A:	$4cost.sinht$
Option B:	$2cost.cosht$
Option C:	$sin3t.sinht$
Option D:	$sint.sinht$
6.	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:	$\frac{\pi}{2}$
7.	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
8.	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$\frac{\cos(n\pi)}{n\pi}$
9.	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:	$l\int_{-l}^{l}(f(x))^2\,dx = \left[\frac{{a_0}^2}{2} + \sum_{n=1}^{\infty}({a_n}^2 + {b_n}^2)\right]$
10.	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:	$v(x,y) = 2x - x^3 + y^3$

11.	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:	$a = -3i\,, b = -3\,, c = -i$
12.	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:	$2xy + x$
13.	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
14.	If E denotes the Expectation, the variance of a random variable X is denoted as?
Option A:	$[E(X)]^2$
Option B:	$E(X^2) - [E(X)]^2$
Option C:	$E(X^2)$
Option D:	$2E(X)$
15.	If $f(x)$ is probability density function for a continuous random variable X then it satisfies the equation.
Option A:	$\int f(x)dx = \infty\,, -1 \le x \le 1$
Option B:	$\int f(x)dx = 1\,, -\infty \le x \le \infty$
Option C:	$\int f(x)dx = 0\,, -\infty \le x \le \infty$
Option D:	$\int f(x+2)dx = 0.5\,, -\infty \le x \le \infty$
16.	The probability function of a random variable is defined as X | -1 | -2 | 0 | 1 | 2 f(x) | k | 2k | 3k | 4k | 5k Then k is equal to
Option A:	Zero
Option B:	¼
Option C:	1/15
Option D:	one
17.	Var(4X+8) is
Option A:	12Var(X)
Option B:	4Var(X)+8
Option C:	16Var(X)+8
Option D:	16Var(X)

18.	The lines of regression intersect at the point
Option A:	(X, Y)
Option B:	$(\bar{X}, \bar{Y})$
Option C:	$(0,0)$
Option D:	$(1,1)$
19.	If regression co-efficient are positive , then
Option A:	Correlation co-efficient is positive
Option B:	Correlation co-efficient is negative
Option C:	Correlation co-efficient is positive & negative
Option D:	Correlation co-efficient is zero
20.	If β_{XY} and β_{YX} are two regression co-efficient , they have
Option A:	Same sign
Option B:	Opposite sign
Option C:	Either same or opposite sign
Option D:	± 1

Q2 . **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	Evaluate $\int_0^\infty e^{-st} \frac{sin^2(\frac{at}{2})}{t} dt$.
B	Find inverse laplace transform using convolution theorem for $\frac{1}{s^2(s+a)^2}$.
C	Find fourier series for $f(x) = \frac{3x^2 - 6x\pi + 2\pi^2}{12}$ in $(0,2\pi)$.
D	Construct an analytic function whose real part is $e^x cosy$.
E	A random variable X has the following probability density function $f(x) = \begin{cases} ke^{-kx} & x > 0, k > 0 \\ 0 & elsewhere \end{cases}$ Find the m.g.f and hence , the mean and variance .
F	Find Karl Pearson's coefficient of correlation for the following data : X : 12 17 22 27 32 Y : 113 119 117 115 121

Q3. **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	Find the laplace transform of $\frac{1-cost}{t^2}$.
B	Find the inverse laplace transform of $\frac{s^2}{(s^2+a^2)(s^2+b^2)}$.
C	Obtain half range sine series to represent $(x) = \begin{cases} \frac{2x}{3} & 0 \le x \le \frac{\pi}{3} \\ \frac{\pi - x}{3} & \frac{\pi}{3} \le x \le \pi \end{cases}$.
D	Find the orthogonal trajectories of the family of curves $x^2 - y^2 + x = c$
E	A continuous random variable has probability density function $f(x) = kx^2(1-x^3),\ 0 < x < 1$. $Find\ i)\ k\ \ ii)\ mean\ \ iii) variance$.
F	Calculate Rank correlation co-efficient for the following data :

	X : 10 12 18 18 15 40 Y : 12 18 25 25 50 25