University of Mumbai
Examination 2020
Program : Computer Engineering
Curriculum scheme: Rev 2019
Examination: Second year semester-III
Course Code : CSC301   Course name : Applied Mathematics-III

Time : 2 hour   Max. Marks: 80

Q.1	Choose the correct option for following questions. All the MCQ given below are compulsory and carry 02 marks each.
1.	The Laplace transform of $(4t^2 + \sin 3t + e^{2t})$ is
Option A	$4 \cdot \frac{2}{S^3} + \frac{3}{S^2+3^2} + \frac{1}{S-2}$
HOption B	$\frac{2}{S^3} + \frac{3}{S^2+3^2} + \frac{1}{S-2}$
Option C	$4 \cdot \frac{2}{S^3} + \frac{3}{S^2+3^2}$
Option D	$\frac{2}{S^3} + \frac{3}{S^2 + 3^2} + \frac{4}{S - 2}$
2.	Change of scale property of Laplace transform states that if L [f (t)] = $\emptyset(s)$ then
Option A	L[f(at)] = $\frac{1}{a} \emptyset \left(\frac{s}{a}\right)$
Option B	L[f(at)] = $a \, \emptyset \left(\frac{s}{a}\right)$
Option C	L[f(at)] = $\frac{1}{a} \emptyset \left(\frac{s}{t}\right)$
Option D	L[f(at)] = $\frac{1}{a} \emptyset \left(\frac{s}{t}\right)$
3.	The coefficient a_n for the function f(x) = 1-x^2 where -1< x <1 is
Option A	Zero
Option B	-4nπ
Option C	$-4 \frac{(-1)^n}{n\pi}$
Option D	$-4 \frac{(-1)^n}{n^2\pi^2}$
4.	Laplace transform of $\left[\frac{d}{dt}\left(\frac{\sin 3t}{t}\right)\right]$ is

Option A	$3 + tan^{-1}x$
Option B	$-3 - s\,Cot^{-1}\left(\frac{S}{3}\right)$
Option C	$Cot^{-1}\left(\frac{S}{3}\right)$
Option D	$\frac{1}{s}\,Cot^{-1}\left(\frac{S}{3}\right)$

5.	Cauchy Riemann equation in cartesian coordinates are
Option A	$\frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}$
Option B	$\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$
Option C	$\frac{\partial u}{\partial x} = -\frac{\partial u}{\partial y}, \frac{\partial v}{\partial x} = \frac{\partial v}{\partial y}$
Option D	$\frac{\partial u}{\partial x} = \frac{\partial v}{\partial x}, \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$

6.	The angle of intersection of the curve r = $sin\theta + cos\theta$ and r = $2sin\theta$
Option A	$\frac{\pi}{2}$
Option B	$\frac{3\pi}{2}$
Option C	$\frac{\pi}{3}$
Option D	$\frac{\pi}{4}$

7.	Out of the two equations given below which can be a line of regression of x on y ?
Option A	2x+ 3y -8 = 0
Option B	3x+ 2y -8 = 0
Option C	2x+ 3y -6 = 0
Option D	3x+ 2y -6 = 0

8.	Two unbiased dice are thrown. Find the expectation of the sum.
Option A	7
Option B	8
Option C	9
Option D	10
9.	If $f(z) = x^2 + 2axy + by^2 + i(cx^2 + 2dxy + y^2)$ is analytic then a,b,c,d are
Option A	$a = 1, b = 1, c = -1, d = -1$

Option B	$a = 1, b = -1, c = 1, d = 1$
Option C	$a = 1, b = 1, c = -1, d = -1$
Option D	$a = 1, b = -1, c = -1, d = 1$
10.	The harmonic conjugate of $e^{-y} sinx$.
Option A	$e^y cosx + C$
Option B	$e^{-y} cosx + C$
Option C	$e^{-x} cosy + C$
Option D	$e^{-x} siny + C$
11.	If $f(z) = ze^z$ then its real part u is given by
Option A	$e^x \{ x\, siny + y\, cosy \}$
Option B	$e^x \{ y\, siny + x\, cosy \}$
Option C	$e^x \{ x\, cosy - y\, siny \}$
Option D	$e^x \{ y\, siny - x\, cosy \}$
12.	Laplace Transform of $\left\{ \frac{cosat - cosbt}{t} \right\}$ is
Option A	$\frac{1}{2} log \left(\frac{s^2 + b^2}{s^2 + a^2} \right)$
Option B	$\frac{1}{2} log \left(\frac{s^2 - b^2}{s^2 - a^2} \right)$
Option C	$\frac{1}{2} log \left(\frac{s^2 + a^2}{s^2 + b^2} \right)$
] Option D	$\frac{1}{2} log \left(\frac{s^2 - a^2}{s^2 - b^2} \right)$
13	Inverse Laplace Transform of $\frac{1}{s(s+1)}$
Option A	$e^{-t} - 2$
Option B	$e^{-t} - 2t$
Option C	$1 + e^{-t}$
Option D	$1 - e^{-t}$
14	Inverse Laplace Transform of $cot^{-1}(2s)$
Option A	$\frac{1}{t} cost$
Option B	$\frac{1}{t} sin \left(\frac{t}{2} \right)$

Option C	$$\frac{1}{2t} \sin\left(\frac{t}{2}\right)$$
Option D	$$\frac{1}{t} \cos\left(\frac{t}{2}\right)$$
15.	Inverse Laplace Transform of $\frac{1}{s(s^2+4)}$
Option A	$$\frac{1}{2}(1 - cos2t)$$
Option B	$$\frac{1}{4}(1 + cos2t)$$
Option C	$$\frac{1}{2}(1 + cos2t)$$
Option D	$$\frac{1}{4}(1 - cos2t)$$
16.	Half range sine series for $f(x) = \frac{\pi}{4}$ in $(0, \pi)$ is given by
Option A	$\frac{\pi}{4} = sinx + \frac{sin2x}{2} + \frac{sin3x}{3} + $ ------------
Option B	$\frac{\pi}{4} = sinx + \frac{sin3x}{3} + \frac{sin5x}{5} + $ ------------ *
Option C	$\frac{\pi}{4} = sinx - \frac{sin3x}{3} + \frac{sin5x}{5} - $ ------------
Option D	$\frac{\pi}{4} = sinx - \frac{sin2x}{2} + \frac{sin3x}{3} - $ ------------
17.	The mean of a continuous variable which has probability density function f(x) = 6(x-x^2) , $0 \leq x \leq 1$ is
Option A	1/5
Option B	1/4
Option C	1/3
Option D	1/2
18.	A fair coin is tossed till a head appears.What is the expectation of the number of tossed required?
Option A	4
Option B	3
Option C	2
Option D	1
19.	An equation of the line of regression of y on x for the following data is

	X : 5 6 7 8 9 10 11 Y : 11 14 14 15 12 17 16
Option A	Y = 8.7143 + 0.6786X
Option B	Y = -2.0053 + 0.7074X
Option C	X= 8.7143 +0.6786Y
Option D	X = -2.0053 + 0.7074Y
20.	Find coefficient of correlation between price and demand.

Price	2	3	4	7	4
Demand	8	7	3	1	1

Option A	0.78
Option B	-0.81
Option C	-0.85
Option D	0.89

Q.2	Solve any four questions,each carries 5 marks.
A	The equation of two lines of regression are $3x + 2y = 26$, $6x + y = 31$. Find coefficient of Correlation between x and y.
B	Find the Fourier coefficient a_n in half range cosine series for the function $$f(x) = lx - x^2 , \quad 0 < x < l$$
C	Find the Laplace Transform of $\{t \ sin2t \ e^{2t}\}$
D	Find the harmonic conjugate of $e^{-y} sinx$.
E	A continuous random variable has probability density function f(x) = k (x − x^2) , $0 \le x \le 1$ Find mean and median.
F	Find the inverse laplace transform of $\log (\dfrac{s^2 + a^2}{s^2 + b^2})$

Q.3	Solve any four questions,each carries 5 marks.
A	If X ,Y are independent poisson variates such that P(X=1) = P(X=2) and P (Y=2) = P (Y=3) then what is the variance of 2x-3y ?
B	Find rank correlation coefficient between x and y

X	12	17	22	27	32
Y	113	119	117	115	121

C	Find Fourier coefficient a_0 for the function $f(x) = \begin{cases} x + \frac{\pi}{2}, -\pi < x < 0 \\ \frac{\pi}{2} - x, 0 < x < \pi \end{cases}$
D	Find the analytic function whose imaginary part is $v = sinhx\ cosy$
E	Find the Inverse Laplace Transform of $\frac{1}{s\sqrt{s+4}}$
F	Find the Laplace transform of $f(t) = cost$ for $0 < t < \pi$