UOM Exam Second half 2021_Question paper_R2019/CSC301 - Engineering Mathematics III /Sem-III / COMPUTER ENGINEERING / ARTIFICIAL INTELLIGENCE AND DATA SCIENCE / ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING / COMPUTER SCIENCE AND ENGINEERING (Artificial Intelligence and Machine Learning / COMPUTER SCIENCE AND ENGINEERING (Data Science) / COMPUTER SCIENCE AND ENGINEERING (Internet of Things and Cyber Security Including Block Chain Technology) / CYBER SECURITY / DATA ENGINEERING / INTERNET OF THINGS (IoT)

Dear Student,
Please note before you attempt this section of examination:
1. Q1, Q2, Q3 and Q4 carry 20 marks each.
2. This paper contains 20 Marks MCQ and 60 marks subjective section for 150 minutes duration.
3. It is mandatory for all the students to upload their answer papers in a single PDF format only.
4. You have to write Date of Examination, Seat number, Program, Scheme and semester, Subject name, Signature on EVERY PAGE.
5. Remain in the meet with your camera on and you in clear view throughout the duration of the exam.

* Required

1. Email *

2. Student Name (As per exam form filled) *

3. Seat No *
Refer Hall ticket

Solve Questions as per the instructions given separately.

- Please upload a single PDF for Q1 to Q4
- For MCQs Question write Question number & correct option with complete text in option.
- Q2 to Q4 are subjective questions - Solve Questions as per the instructions and marks allotted.

page 1/6

Q 1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks** **2 marks each**
1.	Laplace transform of $e^{-5t}(t^2+sin2t)$ *is*
Option A:	$\frac{2}{(s+5)^3}+\frac{2}{(s+5)^2+2^2}$
Option B:	$\frac{2}{(s-5)^3}+\frac{2}{(s-5)^2+4}$
Option C:	$\frac{3}{(s+5)^3}+\frac{s}{(s+5)^2+2^2}$
Option D:	$\frac{2}{(s+5)^2}+\frac{2}{(s+5)^2-2^2}$
2.	If $L\{F(t)\}=\frac{3s}{s^2+1}$, then $L\{F(2t)\}$ at s=1, is
Option A:	$\frac{3}{5}$
Option B:	$\frac{2}{5}$
Option C:	$-\frac{3}{5}$
Option D:	$\frac{7}{5}$
3.	Inverse Laplace transform of $\frac{1}{s^2+4}$ *is*
Option A:	$\int_0^t cos2udu$
Option B:	$\int_0^t sin2udu$
Option C:	$\int_0^t cos3udu$
Option D:	$\int_0^t cosudu$

page 2/6

4.	Inverse Laplace transform of f(s)= $\frac{6e^{-5s}}{(s+2)^4}$ *is*
Option A:	$f(t)=\begin{cases}0 & 0<t<5\\ e^{-2(t-5)}(t-5)^3 & t>5\end{cases}$
Option B:	$f(t)=\begin{cases}0 & 0<t<5\\ e^{-2(t-5)}(t-5)^4 & t>5\end{cases}$
Option C:	$f(t)=\begin{cases}0 & t>5\\ e^{-2t}t^3 & t<5\end{cases}$
Option D:	$f(t)=\begin{cases}0 & 0<t<5\\ e^{-2t}t^5 & t>5\end{cases}$
5.	If $f(z)=u(x,y)+iv(x,y)$ is analytic then $f'(z)$ *is equal to*
Option A:	$\frac{\partial u}{\partial x}-i\frac{\partial v}{\partial y}$
Option B:	$\frac{\partial u}{\partial x}+i\frac{\partial v}{\partial x}$
Option C:	$\frac{\partial u}{\partial y}+i\frac{\partial v}{\partial x}$
Option D:	$\frac{\partial u}{\partial x}-i\frac{\partial v}{\partial x}$
6.	The value of 'm' so that $2x-x^2+my^2$ is harmonic, is
Option A:	0
Option B:	-1
Option C:	1
Option D:	3
7.	The value of coefficient of correlation lies between
Option A:	0 to 1
Option B:	-∞ *to* 1
Option C:	0 to ∞
Option D:	-1 to 1

page 3/6

8.	The rank correlation coefficients of the following data is

X	23	25	27	29	31	33
Y	43	45	47	49	51	53

Option A:	0
Option B:	-1
Option C:	1
Option D:	0.99
9.	Expansion of Fourier series of $f(x)=x$ in (-1, 1) is
Option A:	$f(x) = \sum_{n=1}^{\infty} \frac{2}{n\pi}(-1)^n \sin n\pi x$
Option B:	$f(x) = \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} \sin nx$
Option C:	$f(x) = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} \sin n\pi x$
Option D:	$f(x) = \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} \sin n\pi x$
10.	What would be the expectation of the number of failures preceding the first success in an infinite series of independent trials with the constant probability of success p and failure q
Option A:	$\frac{p}{q}$
Option B:	$\frac{q}{p}$
Option C:	$\frac{p+1}{q}$
Option D:	$\frac{p^2}{q^2}$

page 4/6

<table>
<tr><td>Q 2.</td><td>Solve any Four out of Six 5 marks each</td></tr>
<tr><td>A</td><td>Find Laplace transform of $e^{-3t}t\sqrt{1-sin2t}$</td></tr>
<tr><td>B</td><td>Find inverse Laplace transforms of $\frac{5s^2-15s-11}{(s+1)(s-2)^2}$</td></tr>
<tr><td>C</td><td>Expand Fourier Series for $f(x)=\frac{1}{2}(\pi-x)$ in $(0,2\pi)$.</td></tr>
<tr><td>D</td><td>Find constants a, b, c, d and e, if
$(ax^4+bx^2y^2+cy^4+dx^2-2y^2)+i(4x^3y-exy^3+4xy)$
is analytic.</td></tr>
<tr><td>E</td><td>Ten students got the following percentage of marks in mathematics and statistics
<table>
<tr><td>Maths</td><td>78</td><td>36</td><td>98</td><td>25</td><td>75</td><td>82</td><td>90</td><td>62</td><td>65</td><td>39</td></tr>
<tr><td>Stats</td><td>84</td><td>51</td><td>91</td><td>60</td><td>68</td><td>62</td><td>86</td><td>58</td><td>53</td><td>47</td></tr>
</table>
Calculate the coefficient of correlation.</td></tr>
<tr><td>F</td><td>A bolt is manufactured by three machines A, B and C. A turns out twice as many times as B, and machines B and C produce equal number of items . 3% of bolts produced by A and B are defective and 5% of bolts produced by C are defective. All bolts are put into one stock pile and one is chosen from this pile. What is the probability that it is defective?</td></tr>
</table>

page 5/6

Q. 3 **Solve any Four out of Six** **5 marks each**

A By using Laplace transform, evaluate $\int_0^{\infty} \frac{sin2t+sin3t}{te^t}$

B By using Convolution theorem, find inverse Laplace transform of $\frac{s}{(s^2+1)(s^2+4)}$

C Expand Fourier Series for $f(x) = 1 - x^2$ in $(-1, 1)$

D Find the analytic function $f(z) = u + iv$, in terms of z, if $v = \frac{\sinh 2y}{\cosh 2y + \cos 2x}$

E Obtain the equations of the lines of regression for the following data.

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

F A random variable X has the following probability distribution

X	-2	-1	0	1	2	3
P	0.1	K	0.1	2K	0.2	3K

(i) Find the constant K. (ii) Find the mean and variance of X.

page 6/6

Q. 4	Solve any Four out of Six 5 marks each
A	Find Laplace transform of $\int_0^t e^{-2u}\cos^2 u\,du$
B	Find Inverse Laplace transform of $\frac{1}{s}\log\sqrt{\left(\frac{s^2+9}{s^2+16}\right)}$
C	Find the half range cosine series for f (x) = $(x-1)^2$; 0< x < 1
D	Find the family of curves orthogonal to the family of curves $x^3y - xy^3 = c$
E	Fit a straight line of the form y=a+bx to the following data
F	A random variable x has probability density function $f(x) = \begin{cases} kx^2e^{-x} & x>0, \quad k>0 \\ 0 & Otherwise \end{cases}$ Find 'k' and hence find mean and variance.

X	1	3	5	7	8	10
Y	8	12	15	17	18	20

4. Please Upload complete scanned answer copy in a single PDF file. *

   Files submitted:

5. Have you uploaded correct scanned copy of the answer sheets. *

   Mark only one oval.

   ◯ YES