

UOM Exam Second half 2021_ Question paper_R2016/Comp/CSC301 - AM-III/Sem-III

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.

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks																						
1.	The fixed points of the bilinear transformation $w = \frac{2(z-1)}{(1+i)z-2}$ are																						
Option A:	both imaginary numbers																						
Option B:	both real irrational numbers																						
Option C:	both real and equal numbers																						
Option D:	both real rational numbers																						
2.	Spearman's rank correlation coefficient for the data: <table border="1" data-bbox="345 625 987 785" style="margin: 10px auto;"> <tr> <td>Rank in Maths</td> <td>1</td><td>3</td><td>7</td><td>5</td><td>4</td><td>6</td><td>2</td><td>10</td><td>9</td><td>8</td> </tr> <tr> <td>Rank in Stats</td> <td>3</td><td>1</td><td>4</td><td>5</td><td>6</td><td>9</td><td>7</td><td>8</td><td>10</td><td>2</td> </tr> </table> is equal to	Rank in Maths	1	3	7	5	4	6	2	10	9	8	Rank in Stats	3	1	4	5	6	9	7	8	10	2
Rank in Maths	1	3	7	5	4	6	2	10	9	8													
Rank in Stats	3	1	4	5	6	9	7	8	10	2													
Option A:	0.4118																						
Option B:	0.1481																						
Option C:	0.4181																						
Option D:	0.1841																						
3.	The coefficient of $\frac{1}{z^4}$ in the z-transform of a sequence $\{-6, -3, -1, 0, 2, 4, 6, 8, 10\}$ is <div style="text-align: right; margin-right: 50px;">↑</div>																						
Option A:	0																						
Option B:	6																						
Option C:	4																						
Option D:	8																						
4.	$L\left\{\sin t H\left(t - \frac{1}{2}\right)\right\} =$																						
Option A:	$\frac{\cos \frac{1}{2} - s \sin \frac{1}{2}}{s^2 + 1} e^{-\frac{1}{2}s}$																						
Option B:	$\frac{\cos \frac{1}{2} + s \sin \frac{1}{2}}{s^2 + 1} e^{\frac{1}{2}s}$																						
Option C:	$\frac{\cos \frac{1}{2} - s \sin \frac{1}{2}}{s^2 + 1} e^{\frac{1}{2}s}$																						
Option D:	$\frac{\cos \frac{1}{2} + s \sin \frac{1}{2}}{s^2 + 1} e^{-\frac{1}{2}s}$																						

5.	In the complex form of Fourier series of $f(x) = x$, $(0, \pi)$ the value of C_2 is
Option A:	$\frac{i}{4}$
Option B:	$\frac{i}{2}$
Option C:	$\frac{-i}{2}$
Option D:	i
6.	If $f(t) = L^{-1}\left\{\frac{1}{s^2+2s+5}\right\}$ then $f(0) =$
Option A:	0
Option B:	1
Option C:	0.5
Option D:	2
7.	The coefficient of $\cos 3t$ in the Fourier series expansion of $f(t) = 3t - 2t^3$ in the interval $(-\pi, \pi)$ is
Option A:	$\frac{1}{3}$
Option B:	$\frac{1}{2}$
Option C:	0
Option D:	1
8.	$L^{-1}\left\{\frac{1}{s(s-1)^2}\right\}$ is
Option A:	$te^t + e^t + 1$
Option B:	$te^t - e^t - 1$
Option C:	$te^t + e^t - 1$
Option D:	$te^t - e^t + 1$

9.	The image of the interior part unit circle in z-plane onto the w- plane under the transformation $w = \frac{i-z}{z+i}$ is
Option A:	Entire half of the w- plane to the right of imaginary axis
Option B:	Entire half of the w- plane to the left of imaginary axis
Option C:	Exterior part of the unit circle in w-plane
Option D:	Interior part of the unit circle in w-plane
10.	Evaluate using Laplace transform: $\int_0^{\infty} e^{-t} \int_0^t e^{-2u} \cos^2 u \, du \, dt$
Option A:	$\frac{7}{15}$
Option B:	$\frac{11}{39}$
Option C:	$\frac{-2}{39}$
Option D:	$\frac{2}{15}$

Q2	Solve any Four out of Six	5 marks each
A	Find Laplace transform of $L\{f(t)\}$ Where $f(t) = t$, $0 < t < 1$ and $f(t)$ is periodic function with period 1.	
B	Obtain Fourier series for $f(x) = 16 - x^2$ in $(-1,1)$.	
C	Show that $u = e^x \cos y - x^2 + y^2$ is harmonic and find the corresponding analytic function $f(z) = u + iv$	
D	Find the equations of two regression lines using the following data: $\bar{x} = 23$, $\bar{y} = 35$, $\sigma_x = 2$, $\sigma_y = 3$, $r_{xy} = 0.6$ Also estimate y when $x = 20$ and x when $y = 38$	
E	Find $L^{-1} \left\{ \frac{s+3}{(s^2+6s+13)^2} \right\}$ using convolution theorem	
F	Find Z-transform of $f(k) = \frac{3^k}{k!}$, $k > 0$	

Q3	Solve any Four out of Six	5 marks each														
A	Using Laplace Transform evaluate the following integral $\int_0^{\infty} e^{-2t} \frac{\sin 3t \cos 2t}{t} dt$															
B	Prove that the set $1, \sin x, \cos x, \sin 2x, \cos 2x, \sin 3x, \dots$ is orthogonal on $(0, 2\pi)$.															
C	If $f(z) = a^2x^2y - c^2y^3 + 2x^2 - 2y^2 + i(b^2xy - x^3 + 3xy^2)$ is analytic, find the possible values of unknown constants a, b, and c.															
D	Find the Karl-Pearson's coefficient of correlation for the following data: <table border="1" data-bbox="406 720 1377 793" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>X</td> <td>120</td> <td>125</td> <td>127</td> <td>130</td> <td>134</td> <td>137</td> </tr> <tr> <td>Y</td> <td>42</td> <td>47</td> <td>48</td> <td>46</td> <td>50</td> <td>49</td> </tr> </tbody> </table>		X	120	125	127	130	134	137	Y	42	47	48	46	50	49
X	120	125	127	130	134	137										
Y	42	47	48	46	50	49										
E	Solve using Laplace transform: $(D^2 + 2D - 3)y = \sin t$, where $D = \frac{d}{dt}$ given : $y(0) = 0, y'(0) = 0$															
F	Find $Z^{-1} \left\{ \frac{1}{\left(z - \frac{1}{2}\right)\left(z - \frac{1}{3}\right)} \right\}, z > \frac{1}{2}$															

Q4	Solve any Four out of Six 5 marks each
A	Find Laplace transform of $L\{t^2 \cos t\}$
B	Find half range sine series for the function $f(x) = \begin{cases} \left(\frac{1}{4}\right) - x, & 0 < x < \left(\frac{1}{2}\right) \\ x - \left(\frac{3}{4}\right), & \left(\frac{1}{2}\right) < x < 1 \end{cases}$
C	Find the image of the infinite strip $\frac{1}{6} \leq y < \frac{1}{4}$ under the transformation $w = \frac{1}{z}$. Show the regions graphically.
D	The equations of the two regression lines are $3x + 2y = 26$ and $6x + y = 31$ Find i) Means of x and y, ii) r, and iii) σ_y when $\sigma_x = 3$
E	Find $L^{-1} \left\{ \frac{1}{s^2(s+3)^2} \right\}$ using partial fraction method.
F	Find Z-transform of $f(k) = \cos\left(\frac{k\pi}{7} - \alpha\right)$, $k \geq 0$

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