2312_IT_Sem-III_R19_EM-III_Inst. Name

1) The Question Paper will have MCQs (for 20 marks) and Subjective/Descriptive Questions (for 60 marks).

2) MCQ correct options and subjective question answers to be written on A4 size papers. Scan all pages of answer papers of Q.1 to Q.4 and create single file in pdf format to upload in the link given.

* Required

1. Enter your Name *

2. Enter your Seat Number *

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Q.1) 1 to 2

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:	$\frac{7}{5}$

Q.1) 3 & 4

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:	$\int_0^t cosudu$
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:	$f(t) = \begin{cases} 0 & 0 < t < 5 \\ e^{-2t}t^5 & t > 5 \end{cases}$

Q.1) 5 to 7

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:	$-\infty$ *to* 1
Option C:	0 to ∞
Option D:	-1 to 1

Q.1) 8 to 10

<table>
<tr><td>8.</td><td>The rank correlation coefficients of the following data is
<table>
<tr><td>X</td><td>23</td><td>25</td><td>27</td><td>29</td><td>31</td><td>33</td></tr>
<tr><td>Y</td><td>43</td><td>45</td><td>47</td><td>49</td><td>51</td><td>53</td></tr>
</table></td></tr>
<tr><td>Option A:</td><td>0</td></tr>
<tr><td>Option B:</td><td>-1</td></tr>
<tr><td>Option C:</td><td>1</td></tr>
<tr><td>Option D:</td><td>0.99</td></tr>
<tr><td></td><td></td></tr>
<tr><td>9.</td><td>Expansion of Fourier series of $f(x)=x$ in (-1, 1) is</td></tr>
<tr><td>Option A:</td><td>$f(x)=\sum_{n=1}^{\infty}\frac{2}{n\pi}(-1)^n \sin n\pi x$</td></tr>
<tr><td>Option B:</td><td>$f(x)=\frac{2}{\pi}\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}\sin nx$</td></tr>
<tr><td>Option C:</td><td>$f(x)=\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}\sin n\pi x$</td></tr>
<tr><td>Option D:</td><td>$f(x)=\frac{2}{\pi}\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n}\sin n\pi x$</td></tr>
<tr><td></td><td></td></tr>
<tr><td>10.</td><td>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</td></tr>
<tr><td>Option A:</td><td>$\frac{p}{q}$</td></tr>
<tr><td>Option B:</td><td>$\frac{q}{p}$</td></tr>
<tr><td>Option C:</td><td>$\frac{p+1}{q}$</td></tr>
<tr><td>Option D:</td><td>$\frac{p^2}{q^2}$</td></tr>
</table>

Q.2

<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>

Q.3

<table>
<tr><td>Q. 3</td><td>Solve any Four out of Six 5 marks each</td></tr>
<tr><td>A</td><td>By using Laplace transform, evaluate $\int_0^{\infty} \frac{sin2t+sin3t}{te^t}$</td></tr>
<tr><td>B</td><td>By using Convolution theorem, find inverse Laplace transform of $\frac{s}{(s^2+1)(s^2+4)}$</td></tr>
<tr><td>C</td><td>Expand Fourier Series for $f(x) = 1 - x^2$ in (-1, 1)</td></tr>
<tr><td>D</td><td>Find the analytic function $f(z) = u + iv$, in terms of z, if $v = \frac{\sinh 2y}{\cosh 2y + \cos 2x}$</td></tr>
<tr><td>E</td><td>Obtain the equations of the lines of regression for the following data.
<table>
<tr><td>X</td><td>65</td><td>66</td><td>67</td><td>67</td><td>68</td><td>69</td><td>70</td><td>72</td></tr>
<tr><td>Y</td><td>67</td><td>68</td><td>65</td><td>68</td><td>72</td><td>72</td><td>69</td><td>71</td></tr>
</table></td></tr>
<tr><td>F</td><td>A random variable X has the following probability distribution
<table>
<tr><td>X</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>P</td><td>0.1</td><td>K</td><td>0.1</td><td>2K</td><td>0.2</td><td>3K</td></tr>
</table>
(i) Find the constant K. (ii) Find the mean and variance of X.</td></tr>
</table>

Q.4

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

3. Upload your answer papers *

   Files submitted:

4. Have you uploaded required pdf file of answers? *

   Mark only one oval.

   ◯ Yes