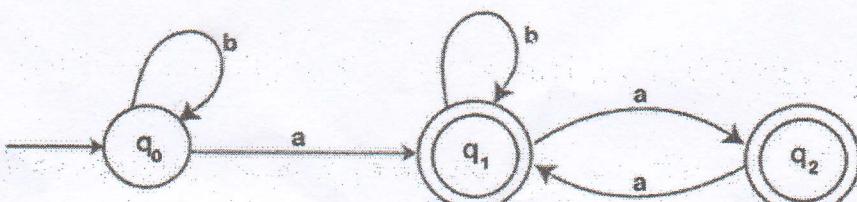
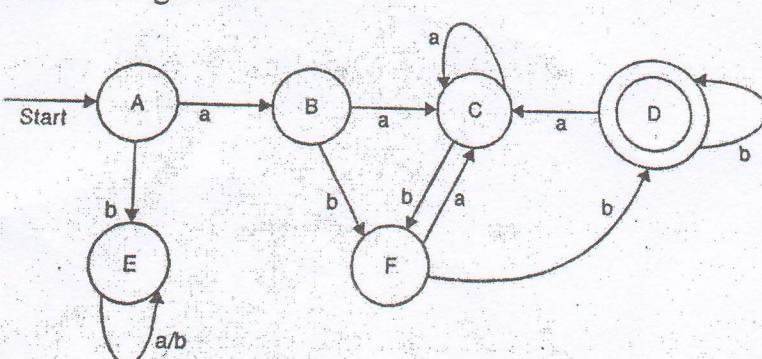


**Semester: January 2022 – May 2022**  
**Examination: In-Semester Examination**

<b>Programme code: 01</b>	<b>Class: SY</b>	<b>Semester: IV</b>
<b>Programme: B. Tech Computer Engineering</b>	<b>(SVU 2020)</b>	

<b>Name of the Constituent College:</b> <b>K. J. Somaiya College of Engineering</b>	<b>Name of the department:</b> <b>COMP</b>
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<b>Course Code:116U01C404</b>	<b>Name of the Course: Theory of Automata with Compiler Design</b>
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<b>Question No.</b>		<b>Max. Marks</b>
Q1 a)	Find the RE equivalent to the following transition diagram:-  	5
Q1 b)	Convert the given regular expression into an $\epsilon$ -NFA RE = $(a+b)^* abc (a+b)^*$	5
Q2	Minimize the given DFA  	10
Q3 a)	Prove that the following language is not Regular. $L=\{a^n b^n c^n \mid n \geq 1\}$ <b>OR</b> Construct DFA for the binary language having strings ending with 011. Also check the acceptance of the string "110011".	5
Q3 b)	Illustrate the Different phases of Compiler with suitable diagrams.  <b>OR</b> Justify the Closure Property for Regular Languages for the following Operation:- a) Union b) Homomorphism	5

PWD



Semester: January 2022 – May 2022  
 Examination: In-Semester Examination

Programme code: 01

Programme: B. Tech Computer Engineering

Class: SY

Semester: IV  
 (SVU 2020)

Name of the Constituent College:

K. J. Somaiya College of Engineering

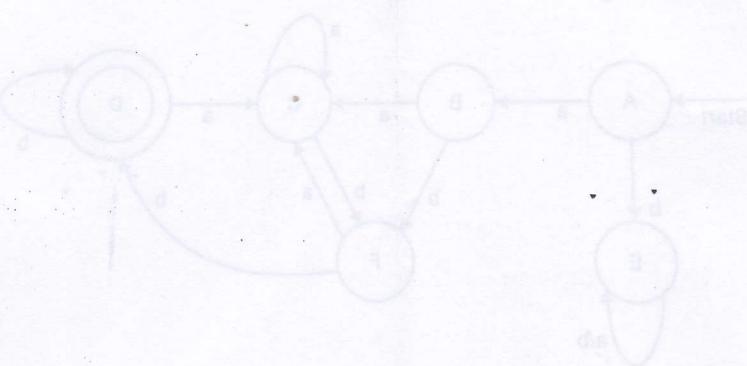
Name of the department:  
 COMP

Course Code: 116U01C404

Name of the Course: Theory of Automata with Compiler Design

Question No.		Max. Marks
Q1 a)	<p>Find the RE equivalent to the following transition diagram:-</p> <p>Expression for 3 states – 2M          Final RE for the FA – 3M</p>	5
Q1 b)	<p>Convert the given regular expression into an <math>\epsilon</math>-NFA</p> $RE = (a+b)^* abc (a+b)^*$ <p><math>(a+b)^*</math> - 2M  <math>abc</math> - 1M  <math>(a+b)^* abc (a+b)^*</math> - 2M</p>	5
Q2	<p>Minimize the given DFA using Myhill Nerode Theorem.</p> <p>Box – 2M          Initial marking of X – 2M          Final Minimized – 3M          Transition diagram of Minimized FA – 2M          Tuple Definition of Minimized Automata – 1M</p>	10
Q3 a)	Prove that the following language is not Regular.	5

	<p><math>L = \{a^n b^n c^n \mid n \geq 1\}</math></p> <p>Partitioning the string in three parts : 2M Proof : 3M</p> <p style="text-align: center;">OR</p> <p>Construct DFA for the binary language having strings ending with 011. Also check the acceptance of the string "110011".</p> <p>Construction : 3M Acceptance : 2M</p>	
Q3 b)	<p>Illustrate the Different phases of Compiler with suitable diagrams.</p> <p>List different phases : 1M Diagram : 2M Illustration : 2M</p> <p style="text-align: center;">OR</p> <p>Justify the Closure Property for Regular Languages for the following Operation:-</p> <p>a) Union - 2M b) Homomorphism - 3M</p>	5



MS - 2M  
MC - 2M  
MI - 2M  
ML - 2M  
MF - 2M

Semester: January 2022 – May 2022  
 Examination: In-Semester Examination

Programme code:

Class: SY

 Semester: IV (SVU  
2020)

Name of the Constituent College:

K. J. Somaiya College of Engineering

Name of the department:

COMP

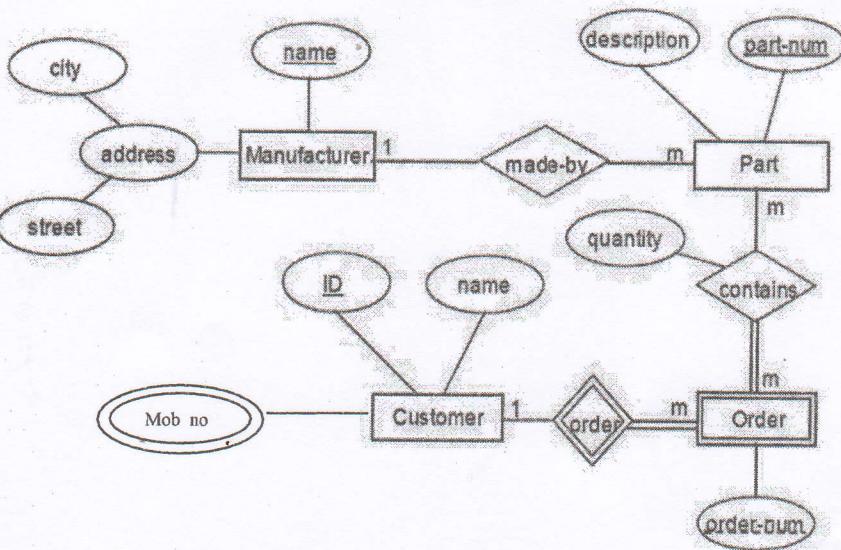
Course Code: 116U01C403

Name of the Course: Relational Database Management System

Question No.		Max. Marks
Q.1	<p>Answer any 2</p> <p>a. What are the drawbacks of file system and which features of DBMS handles those drawback.</p> <p>b. Explain the three level schema architecture of DBMS and different levels of dependencies in this architecture with diagram.</p> <p>c. Draw DBMS architecture and role its components with diagram.</p>	5*2
Q.2	<p>Consider following relation:</p> <p>Student(RollNumber, StudentName, Address)      Teachers(TeacherID, TeacherName, TeachingSubject)      Associated_with(RollNumber, TeacherID)</p> <p>Write the relational algebra expression for the following:</p> <ol style="list-style-type: none"> <li>Find the name of Students who live in ‘Mumbai’.</li> <li>Find the name of teacher who teaches ‘DBMS’ Subject.</li> <li>Find the name of teacher who teaches ‘TAC’ Subject to ‘John Smith’ Student.</li> <li>Delete records of students whose address is ‘Pune’.</li> </ol>	10

OR

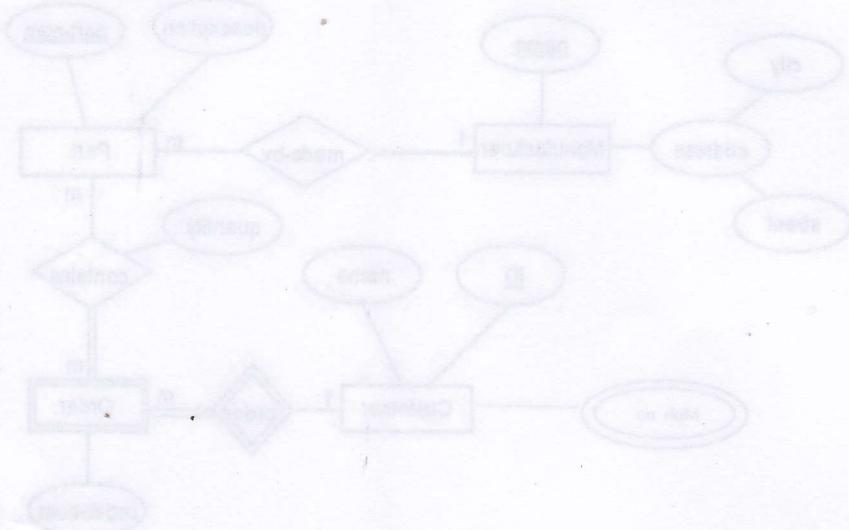
Design Relational Mapping for the following ERD.



```

    erDiagram
        city ||--o address : "address"
        address ||--o manufacturer : "made-by"
        manufacturer ||--o part : "made-by"
        customer ||--o ID : "ID"
        ID ||--o name : "name"
        ID ||--o order : "order"
        order ||--o orderNum : "order-num"
        order ||--o part : "contains"
        part ||--o description : "description"
        part ||--o partNum : "part-num"
        part ||--o quantity : "quantity"
    }
  
```

Q.3	<p>Consider following relations:</p> <p>Person (driver_id, Name, address)</p> <p>Car (license, model, year)</p> <p>Accident (report_no, adate, location)</p> <p>Owns (driver_id, license)</p> <p>Participated (driver_id, license, report_no, damage_amount)</p> <p>Assume some tuples in relations and write the SQL for the following:</p> <ol style="list-style-type: none"> <li>Find total number of people who owned cars that are involved in accidents in 2004.</li> <li>Write DCL command to create new user 'Alice' and grant only select and insert access rights to relation 'Person'.</li> <li>Create a view to count number of reports generated in each location.</li> <li>Write a trigger to raise an exception "No negative damage amount is allowed" while adding entries in the respective table.</li> </ol>	10
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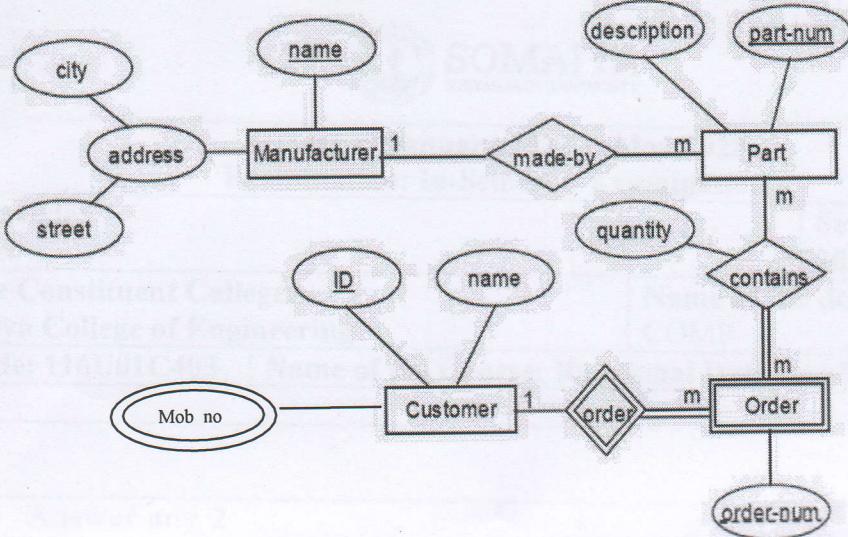


PWD

**Semester: January 2022 – May 2022**  
**Examination: In-Semester Examination**

<b>Programme code:</b> <b>Programme:</b>	<b>Class:</b> SY	<b>Semester:</b> IV (SVU 2020)
<b>Name of the Constituent College:</b> <b>K. J. Somaiya College of Engineering</b>	<b>Name of the department:</b> COMP	
<b>Course Code:</b> 116U01C403	<b>Name of the Course:</b> Relational Database Management System	

<b>Question No.</b>		<b>Max. Marks</b>	<b>CO Mapped</b>
Q.1	<p>Answer any 2</p> <p>a. What are the drawbacks of file system and which features of DBMS handles those drawback.            - List down drawbacks of file system (2.5M)            - Features of DBMS (2.5M)</p> <p>b. Explain the three level schema architecture of DBMS and different levels of dependencies in this architecture with diagram.            - Three level schema architecture (2M)            - Different levels of dependencies (3M)</p> <p>c. Draw DBMS architecture and role its components with diagram.            - Architecture (2M)            - Explanation of components (3M)</p>	5*2	CO1
Q.2	<p>Consider following relation:</p> <p>Student(RollNumber, StudentName, Address)            Teachers(TeacherID, TeacherName, TeachingSubject)            Associated_with(RollNumber, TeacherID)</p> <p>Write the relational algebra expression for the following:</p> <p>i. Find the name of Students who live in ‘Mumbai’. (2.5M)            ii. Find the name of teacher who teaches ‘DBMS’ Subject. (2.5M)            iii. Find the name of teacher who teaches ‘TAC’ Subject to ‘John Smith’ Student. (2.5M)            iv. Delete records of students whose address is ‘Pune’. (2.5M)</p> <p>OR</p> <p>Design Relational Mapping for the following ERD.</p>	10	CO2



- 2.5M for each mapping

- Q.3 Consider following relations:  
 Person (driver\_id, Name, address)  
 Car (license, model, year)  
 Accident (report\_no, adate, location)  
 Owns (driver\_id, license)  
 Participated (driver\_id, license, report\_no, damage\_amount)  
 Assume some tuples in relations and write the SQL for the following:  
 i. Find total number of people who owned cars that are involved in accidents in 2004. (2.5M)  
 ii. Write DCL command to create new user 'Alice' and grant only select and insert access rights to relation 'Person'. (2.5M)  
 iii. Create a view to count number of reports generated in each location. (2.5M)  
 iv. Write a trigger to raise an exception "No negative damage amount is allowed" while adding entries in the respective table. (2.5M)

10 CO2



**Semester: January 2022 – May 2022**  
**Examination: In-Semester Examination**

<b>Programme code: 01</b> <b>Programme: UG</b>	<b>Class: SY</b>	<b>Semester: IV</b> <b>(SVU 2020)</b>
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<b>Name of the Constituent College:</b> <b>K. J. Somaiya College of Engineering</b>	<b>Name of the department:</b> <b>COMP</b>
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<b>Course Code: 116U01C402</b>	<b>Name of the Course: Analysis of Algorithm</b>
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<b>Question No.</b>		<b>Max. Marks</b>
Q1	<p>Explain the following with the help of graph:</p> <ol style="list-style-type: none"> <li>1. Big-oh</li> <li>2. Omega</li> <li>3. Theta Notations</li> </ol> <p>With the help of any algorithm find the Big-oh, Omega and Theta notations</p>	02 02 02 04
Q2	<p>Explain the general method of Divide and Conquer. Sort the given numbers using Quick sort. Show output after every pass clearly.  10, 96, 28, 24, 66, 33, 9, 4, 19</p> <p>Derive the time complexity of the Quick Sort algorithm using the Recursion Tree method. Analyze Quick Sort algorithm for worst case time complexity.</p>	10M (01+05+04)
Q3	<p>What is the difference between Prim's and Kruskal's approach to obtain minimum spanning Trees? Illustrate the results for the following Graph <math>G = (V,E)</math>.</p> <p><b>OR</b></p> <p>Find the shortest path from node 1 to node 8 of the distance network shown in figure below using Dijkstra's Algorithm.</p> <ol style="list-style-type: none"> <li>1. Adjacency matrix for given Graph G (2M)</li> <li>2. Step-wise calculation of Shortest Distance from node 1 to Node 8 (4M)</li> <li>3. Shortest Distance cost and Path from Node 1 to Node 8. (2M)</li> <li>4. Final Shortest path Computation Table (2 M)</li> </ol>	10M (02+04+04)

	<p>A weighted graph with 8 nodes (1-8) and various edges with weights:</p> <ul style="list-style-type: none"> <li>Node 1: 19 (to 3), 11 (to 2), 17 (to 4)</li> <li>Node 2: 10 (to 1), 13 (to 6)</li> <li>Node 3: 14 (to 6), 19 (to 4), 21 (to 1), 19 (to 2)</li> <li>Node 4: 12 (to 5), 17 (to 1)</li> <li>Node 5: 25 (to 7)</li> <li>Node 6: 20 (to 8), 15 (to 3), 22 (to 7)</li> <li>Node 7: 25 (to 5), 18 (to 8)</li> <li>Node 8: 18 (to 7)</li> </ul>	

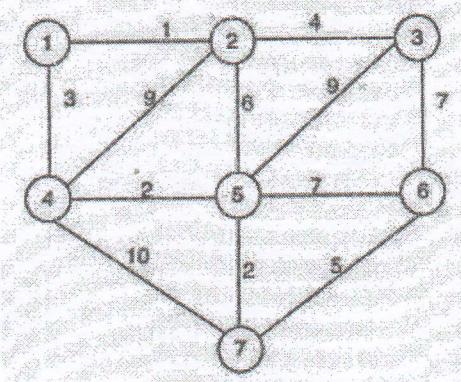
No.	Question	Course Code: IITGU01C403   Name of the Course: Analysis of Algorithms
Q1	Explain the time complexity of the Quick Sort algorithm using the Divide and Conquer method. Show output after every base case recursion. (10+02+04)	With the help of any algorithm find the Big-O, Omega and Theta complexities. Explain the Recursion Tree method. Analyze Quick Sort algorithm for worst case time complexity.
Q2	Explain the time complexity of the Quick Sort algorithm using the Divide and Conquer method. Show output after every base case recursion. Using Quick sort, Show output after every base case recursion. (10, 06, 38, 24, 06, 33, 0, 4, 18)	With the help of any algorithm find the Big-O, Omega and Theta complexities. Explain the time complexity of the Quick Sort algorithm using the Divide and Conquer method. Show output after every base case recursion. Using Quick sort, Show output after every base case recursion.
Q3	What is the difference between Prim's and Kruskal's algorithm to obtain minimum spanning Trees? Illustrate the results for the following Graph G. (03+04+04)	Minimum Spanning Trees. What is the difference between Prim's and Kruskal's algorithm to obtain Minimum Spanning Trees? Illustrate the results for the following Graph G.
Q4	<p>A weighted graph with 9 nodes (1-9) and various edges with weights:</p> <ul style="list-style-type: none"> <li>Node 1: 10 (to 8), 12 (to 5), 14 (to 7)</li> <li>Node 2: 1 (to 3), 2 (to 4), 3 (to 5), 4 (to 6), 5 (to 3), 6 (to 4), 7 (to 1), 8 (to 1), 9 (to 1)</li> <li>Node 3: 1 (to 2), 2 (to 1), 3 (to 5), 4 (to 2), 5 (to 3), 6 (to 4), 7 (to 1), 8 (to 1), 9 (to 1)</li> <li>Node 4: 2 (to 3), 3 (to 2), 4 (to 5), 5 (to 3), 6 (to 4), 7 (to 1), 8 (to 1), 9 (to 1)</li> <li>Node 5: 3 (to 2), 4 (to 3), 5 (to 1), 6 (to 4), 7 (to 1), 8 (to 1), 9 (to 1)</li> <li>Node 6: 4 (to 5), 5 (to 4), 6 (to 1), 7 (to 1), 8 (to 1), 9 (to 1)</li> <li>Node 7: 1 (to 6), 2 (to 1), 3 (to 1), 4 (to 1), 5 (to 1), 6 (to 1), 7 (to 1), 8 (to 1), 9 (to 1)</li> <li>Node 8: 1 (to 7), 2 (to 1), 3 (to 1), 4 (to 1), 5 (to 1), 6 (to 1), 7 (to 1), 8 (to 1), 9 (to 1)</li> <li>Node 9: 1 (to 7), 2 (to 1), 3 (to 1), 4 (to 1), 5 (to 1), 6 (to 1), 7 (to 1), 8 (to 1), 9 (to 1)</li> </ul> <p>OR</p> <p>Find the shortest path from node 1 to node 8 of the distance network shown in figure below using Dijkstra's Algorithm.</p> <p>1. Adjacency matrix for given Graph G (3M)      2. Step-wise selection of shortest distances from node 1 to Node 8 (4M)      3. Shortest Distance cost from Node 1 to Nodes 8. (3M)      4. Final Shortest Path Computation Steps (2 M)</p>	Find the shortest path from node 1 to node 8 of the distance network shown in figure below using Dijkstra's Algorithm.

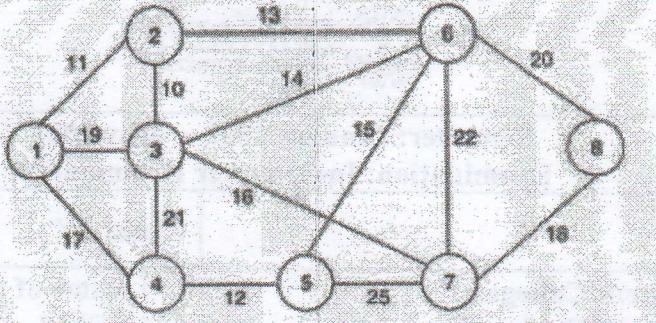
**Semester: January 2022 – May 2022**  
**Examination: In-Semester Examination**

<b>Programme code: 01</b> <b>Programme: UG</b>	<b>Class: SY</b>	<b>Semester: IV</b> <b>(SVU 2020)</b>
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<b>Name of the Constituent College:</b> <b>K. J. Somaiya College of Engineering</b>	<b>Name of the department:</b> <b>COMP</b>
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<b>Course Code: 116U01C402</b>	<b>Name of the Course: Analysis of Algorithm</b>
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<b>Question No.</b>		<b>Max. Marks</b>
Q1	<p>Explain the following with the help of graph:</p> <ol style="list-style-type: none"> <li>1. Big-oh</li> <li>2. Omega</li> <li>3. Theta Notations</li> </ol> <p>With the help of any algorithm find the Big-oh, Omega and Theta notations</p>	02 02 02 04
Q2	<p>Explain the general method of Divide and Conquer. Sort the given numbers using Quick sort. Show output after every pass clearly.            10, 96, 28, 24, 66, 33, 9, 4, 19</p> <p>Derive the time complexity of the Quick Sort algorithm using the Recursion Tree method. Analyze Quick Sort algorithm for worst case time complexity.</p>	10M (01+05+04)
Q3	<p>What is the difference between Prim's and Kruskal's approach to obtain minimum spanning Trees? Illustrate the results for the following Graph <math>G = (V,E)</math>.</p>  <p><b>OR</b></p> <p>Find the shortest path from node 1 to node 8 of the distance network shown in figure below using Dijkstra's Algorithm.</p>	10M (02+04+04)



PWD



Semester: January 2022 – May 2022  
 Examination: In-Semester Examination(PWD)

Programme code: 1

Programme:

Class: SY  
 B.TECH

Semester: IV SVU  
 2020)

Name of the Constituent College:

K. J. Somaia College of Engineering

Name of the department: COMP

Course Code: 116U01C401

Name of the Course: Probability, Statistics and Optimization Techniques

Question No.		Max. Marks																						
Q1	Attempt the followings	6																						
(i)	If $N = 9$ , $\sum x = 45$ , $\sum y = 108$ , $\sum x^2 = 285$ , $\sum y^2 = 1356$ , $\sum xy = 597$ , find correlation coefficient 'r' between variables x & y.	2																						
(ii)	If X is Normal variate with mean 50 and variance 16, find $P(40 < X < 60)$	2																						
(iii)	If X is Poisson variate such that $P(x=0) = 5P(x=2)$ , Find $P(x=3)$	2																						
	<table border="1"> <tr> <td>X</td><td>45</td><td>70</td><td>65</td><td>30</td><td>90</td><td>45</td><td>50</td><td>65</td><td>75</td><td>60</td> </tr> <tr> <td>Y</td><td>35</td><td>90</td><td>70</td><td>40</td><td>95</td><td>40</td><td>40</td><td>80</td><td>80</td><td>50</td> </tr> </table> <p>Using above data, find          (i) Prepare the table to find rank correlation coefficient.          (ii) write the formula for rank correlation coefficient and calculate it.</p>	X	45	70	65	30	90	45	50	65	75	60	Y	35	90	70	40	95	40	40	80	80	50	6=3+3
X	45	70	65	30	90	45	50	65	75	60														
Y	35	90	70	40	95	40	40	80	80	50														
Q2	OR																							
	<table border="1"> <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>35</td><td>66</td><td>72</td><td>72</td><td>69</td><td>71</td> </tr> </table> <p>Using above data, find          (i) Prepare the table to find appropriate regression coefficient to estimate y          (ii) Obtain regression line of y on x and estimate value of y when x=71</p>	x	65	66	67	67	68	69	70	72	y	67	68	35	66	72	72	69	71					
x	65	66	67	67	68	69	70	72																
y	67	68	35	66	72	72	69	71																
Q3	Attempt any THREE	18																						
	<p>The joint probability distribution function of (X,Y) is given by</p> <table border="1"> <tr> <th rowspan="2">X</th> <th colspan="3">Y</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> </tr> <tr> <td>0</td> <td>3K</td> <td>6K</td> <td>9K</td> </tr> <tr> <td>1</td> <td>5K</td> <td>8K</td> <td>11K</td> </tr> <tr> <td>2</td> <td>7K</td> <td>10K</td> <td>13K</td> </tr> </table> <p>(i) Find value of k , (ii) Find the marginal probability distribution of X and          (iii) <math>P(X \leq 1, Y \leq 2)</math></p>	X	Y			1	2	3	0	3K	6K	9K	1	5K	8K	11K	2	7K	10K	13K	2+2+2			
X	Y																							
	1	2	3																					
0	3K	6K	9K																					
1	5K	8K	11K																					
2	7K	10K	13K																					
(ii)	<p>Three machines A,B,C produce respectively 50%,30% &amp; 20% of the total number of items of a factory. The percentage of defective outputs of these machines are respectively 2%,3% &amp; 4%. An item is chosen at random and found to be defective . Find</p> <p>(i) the item chosen is defective          (ii) write the formula for Bayes theorem          (iii) find the probability that it was produced by the factory A</p>	3+1+2																						

(iii)	X is Uniform Distribution over the range (2,b) such that $P(3 < X < 6) = 0.3$ , find (i)b (ii)mean (iii)variance of X	2+2+2
(iv)	The daily consumption of milk in excess of 20 kilter's in a town is approximately exponentially distributed with parameter $1/3000$ . The town has daily stock of 35 kilter's. (i) Name the distribution to be used (ii) write the formula of pdf for this distribution (iii) Find the probability that of 2 days selected at random the stock is sufficient for both days.	1+1+4



**Semester: January 2022 – May 2022**  
**Examination: In-Semester Examination**

<b>Programme code: 1 Programme:</b>	<b>Class: SY B.TECH</b>	<b>Semester: IV SVU 2020)</b>
<b>Name of the Constituent College: K. J. Somaiya College of Engineering</b>		<b>Name of the department: COMP</b>
<b>Course Code: 116U01C401</b>		<b>Name of the Course: Probability, Statistics and Optimization Techniques</b>

<b>Question No.</b>		<b>Max. Marks</b>																																								
Q1	Attempt the followings	6																																								
(i)	If $N = 9$ , $\sum x = 45$ , $\sum y = 108$ , $\sum x^2 = 285$ , $\sum y^2 = 1356$ , $\sum xy = 597$ , find correlation coefficient 'r' between variables x & y.																																									
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(iii)	If X is Poisson variate such that $P(x=0) = 5P(x=2)$ , Find $P(x=3)$																																									
Q2	<p>From the following data, find rank correlation coefficient.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>X</td><td>45</td><td>70</td><td>65</td><td>30</td><td>90</td><td>45</td><td>50</td><td>65</td><td>75</td><td>60</td> </tr> <tr> <td>Y</td><td>35</td><td>90</td><td>70</td><td>40</td><td>95</td><td>40</td><td>40</td><td>80</td><td>80</td><td>50</td> </tr> </table> <p>OR</p> <p>Obtain regression line of y on x and estimate value of y when x=71</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <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>35</td><td>66</td><td>72</td><td>72</td><td>69</td><td>71</td> </tr> </table>	X	45	70	65	30	90	45	50	65	75	60	Y	35	90	70	40	95	40	40	80	80	50	x	65	66	67	67	68	69	70	72	y	67	68	35	66	72	72	69	71	6
X	45	70	65	30	90	45	50	65	75	60																																
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X	Y																																									
	1	2	3																																							
0	3K	6K	9K																																							
1	5K	8K	11K																																							
2	7K	10K	13K																																							
(ii)	Three machines A,B,C produce respectively 50%,30% & 20% of the total number of items of a factory. The percentage of defective outputs of these machines are respectively 2%,3% & 4%.An item is chosen at random and found to be defective . Using Bayes theorem findthe probability that it was produced by the factory A																																									
(iii)	X is Uniform Distribution over the range (2,b) such that $P(3 < X < 6) = 0.3$ ,find mean and variance of X																																									
(iv)	The daily consumption of milk in excess of 20 kilter's in a town is approximately exponentially distributed with parameter 1/3000 . The town has daily stock of 35 kilter's. Find the probability that of 2 days selected at random the stock is sufficient for both days.																																									