Sanjay Ghodawat University, Kolhapur
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Year and Program:2019-20
B. Tech. Computer Science & Engg.
Course Code : CST203R1
Day and Date: Wednesday 20/11/19

School of Technology
Department of Computer Science & Engg
Course Title: Discrete Structures

End Semester Examination (ESE)

SY B. Tech.
Semester III
Time:- 3hrs
Max Marks:100
10-30 am to 1.30pm

Instructions:
1) All Questions are compulsory
2) Figures to the right indicate full marks
3) Draw neat diagrams with pencil wherever necessary

		Marks	Bloom's Level	CO
Q.1	**A Attempt following**			
	Given $A = \{1, 2, 3, 4\}$ and $B = \{x, y, z\}$. Let R be the following relation from A to B: $R = \{(1, y), (1, z), (3, y), (4, x), (4, z)\}$ (i) Determine the matrix of the relation. (ii) Draw the arrow diagram of R. (iii) Find the inverse relation R^{-1} of R. (iv) Determine the domain and range of R.	**07**	**L1**	**CO2**
	--OR--			
	Given: $A = \{1, 2\}$, $B = \{x, y, z\}$, and $C = \{3, 4\}$. Find: $A \times B \times C$, $B \times A \times C$ and $A \times A$.	**07**	**L1**	**CO2**
	B Attempt following			
	Find Time of earliest completion and time of latest completion for following PERT graph. Also find the critical path.	**08**	**L3**	**CO3**

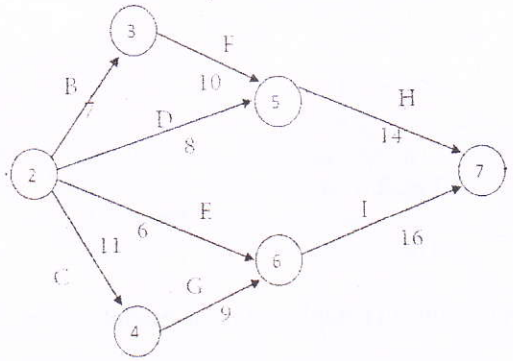


Fig. 1

-- OR --

ESE

Draw the graph G corresponding to each adjacency matrix given below. Find indegree and outdegree of each node. **08** L3 CO4

$$(a)\ A = \begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix} \quad (b)\ A = \begin{bmatrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$$

Q.2 A Attempt following

Obtain PDNF & PCNF of the formula without constructing truth table. **07** L3 CO1

i. $(A \rightarrow B) \wedge (A \rightarrow C)$

ii. $(P \vee Q) \rightarrow R$

-- OR --

The propositions p, q, and r are given below: **07** L2 CO1

p : You have the flu.

q : You miss the final examination.

r : You pass the course.

Express following symbolic propositions as English sentences.

i) $p \rightarrow q$ *ii)* $\neg q \leftrightarrow r$ *iii)* $q \rightarrow \neg r$ *iv)* $p \vee q \vee r$

v) $(p \rightarrow \neg r) \vee (q \rightarrow \neg r)$ vi) $(p \wedge q) \vee (\neg q \wedge r)$ vii) $\neg p$

B Attempt following

Determine if the lattice L shown in Figure below is distributive and/or complemented lattice. **08** L3 CO3

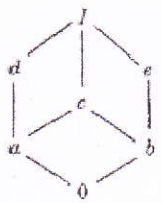


Fig. 2

-- OR --

Express following Boolean expressions in complete sum-of-products form and product of sums form. **08** L3 CO3

i) $\mathbf{y(x + yz)'}$

ii) $\mathbf{x(xy + y' + x'y)}$

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3 **Solve any TWO from following**

A In a class of 30 students, 10 got grade *A* on the first test, 9 got grade *A* on a second test, and 15 did not get grade *A* on either test. Find the number of students who got
(a) grade *A* on both tests;
(b) grade *A* on the first test but not the second;
(c) grade *A* on the second test but not the first.

Draw the Venn diagram. **08** **L3** **CO1**

B Determine adjacency list representation of following graph : **08** **L2** **CO3**

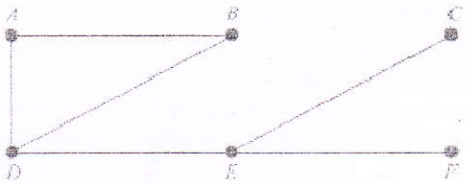


Fig. 3

C Show that **08** **L3** **CO1**

i) The propositions $\neg(p \wedge q)$ and $\neg p \vee \neg q$ are logically equivalent.

ii) The proposition $p \vee \neg(p \wedge q)$ is a tautology.

D Use Karnaugh map to minimize following Boolean expressions **08** **L3** **CO1**

$E = xy'w + xyz + x'y'z' + x'yzw'$
$E = xyz' + x'yz + x'z'$

4 **Solve any TWO from following**

A Suppose a student wants to make up a schedule for a seven-day period which she will study one subject each day. She is taking four subjects: mathematics, physics, chemistry, and economics. We want to know the number of schedules that devote at least one day to each subject? **09** **L3** **CO1**

B Consider all positive integers with three different digits. (Note that zero cannot be the first digit.) Find the number of them which are: (a) greater than 700; (b) odd; (c) divisible by 5. **09** **L3** **CO3**

C Explain the algorithm to generate permutations of 4 numbers from the set S = {1,2,3,4}. **09** **L2** **CO2**

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Q. 5	**Solve any TWO from following**				
A	Out of 100,000 people, 51,500 are female and 48,500 are male. Among the females 9,000 are graduates, and among the males 30,200 are graduates. Suppose we are to choose a person at random. Find the probability of selecting i) a graduate person ii) a female iii) graduate and female iv) graduate or female	**09**	**L3**	**CO5**
B	Three different machines M1, M2 and M3 were used for producing a large batch of similar manufactured items. Suppose that 20% of the items were produced by m1,30% by m2 and 50% by m3.suppose further that 1% of the items produced by m1 are defective,that2% of the items produced by m2 are defective and that 3% of the items produced by m3 are defective. Suppose one item is selected at random from the entire batch and it is found to be defective. Examine the probability that this item was produced by machine M3.	**09**	**L4**	**CO5**
C	There were three candidates for the position of the chairman of a college Mr. X, Mr. Y and Mr. Z whose chances of getting appointments are in the ratio 4:2:3 respectively. The probability that Mr. X if selected would introduce computer education in the college is 0.3. The probabilities of Mr. Y and Mr. Z doing the same are 0.5 and 0.8 respectively. What is the probability that there was computer education in the college?	**09**	**L4**	**CO5**
Q.6	**Solve any THREE from following**			
A	Find the number of automobile license plates where: (a) Each plate contains 2 different letters followed by 3 different digits. (b) The first digit cannot be 0.	**06**	**L3**	**CO**
B	A history class contains 8 male students and 6 female students. Find the number n of ways that the class can elect: (a) 1 class representative; (b) 2 class representatives, 1 male and 1 female; (c) 1 president and 1 vice president.	**06**	**L3**	**CO**
C	Explain the concepts of information content and mutual information in information theory.	**06**	**L2**	**CO**
D	Explain Bayes' theorem with suitable examples.	**06**	**L2**	**CO**

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