B-Tech-sem-III, (2014 course), computer-winter-2018

B. Tech. Sem - III (Computer Engg.) 2014 COURSE) (CBCS) :
WINTER - 2018
SUBJECT: DISCRETE MATHEMATICS AND GRAPH THEORY

Day: Friday
Date: 30/11/2018

Time: 10:00AM TO 1:00PM
Max. Marks: 60

W-2018-2294

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat diagrams **WHEREVER** necessary.

Q.1 **a)** Write the following in symbolic notations. **(05)**

P: Food is good.
Q: Service is good.
R: Restaurant is 5 star.

i) Either food is good or service is good but not both.
ii) Food is good while the service is poor.
iii) It is not the case that both food is good and rating is 5 star.
iv) If both the food and service are good then the rating will be 5 star
v) It is not true that 5 star rating always means good food and good service.

b) Show that the following are tautologies : **(05)**

i) $(p \wedge (p \rightarrow q)) \rightarrow q$

ii) $(p \rightarrow q) \leftrightarrow (\sim p \vee q)$

OR

Q.1 **a)** Among integers 1 to 300, how many of them are divisible neither by 3, nor by 5, nor by 7? How many of them are divisible by 3 but not by 5 nor by 7? **(05)**

b) Illustrate the distributive law $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ with venn diagrams. **(05)**

Q.2 **a)** What do you mean by transitive closure of a relation R? Obtain transitive closure of $R = \{(1,2)(2,3)(3,3)\}$ **(05)**

b) Define the following with examples. **(05)**

i) Equivalence relation
ii) Partial order relation

OR

Q.2 **a)** Given $A = \{1,2,3,4\}$ & $B = \{x,y,z\}$ Let R be the following relation from A to B **(05)**
$R = \{(1,y)\ (1,z)\ (3,y)\ (4,x)\ (4,z)\}$

i) Determine matrix of relation.
ii) Find the Domain and Range of relation.
iii) Find inverse relation R^{-1} of R
iv) Draw the diagraph of R.

b) Define Recurrence Relation and solve the following: Hemant deposits rupees 10,000 in saving account at bank. The annual interest rate of bank is 9% define recurrence relation to compute the amount an at the end of n^{th} years in his account. **(05)**

P.T.O.

Q.3 **a)** Define the term function and give its various types with examples. **(05)**

b) Write short note on hashing function. **(05)**

OR

Q.3 **a)** Define Ackermann function. If $f(x) = x^2 + 1$. And $g(x) = x + 2$ are functions from R to R where R is the set of real numbers find $f \circ g$ and $g \circ f$. **(05)**

b) Give the pigeonhole principle and functions f,g,h are defined on the set $X = \{1,2,3\}$: **(05)**

$f = \{(1,2)\ (2,3)\ (3,1)\}$

$g = \{(1,2)\ (2,1)\ (3,3)\}$

$h = \{(1,1)\ (2,2)\ (3,1)\}$

Find $f \circ g$ and $g \circ f$. Are they equal?

Q.4 **a)** Define the following with the help of diagram: **(05)**
i) Complete graph **ii)** Bipartite graph.

b) What is minimum spanning tree? Give any one algorithm to find out minimum spanning tree. **(05)**

OR

Q.4 **a)** Write the Breadth first search traversal technique with example. **(05)**

b) Define with example. **(05)**
i) Hamiltonian circuit
ii) Eulerian path

Q.5 **a)** Consider the set N of Positive integers and let $*$ denote the operation of least common multiple on N. **(05)**
i) Find $4 * 6, 3 * 5, 9 * 18, 1 * 6$
ii) Find the Identity element of $*$.

b) Define with examples: Rings and fields. **(05)**

OR

Q.5 **a)** Let S be a semigroup with identity e and let b & b' be inverses of each other show that $b = b'$. **(05)**

b) What is commutative semigroup? Give the example. **(05)**

Q.6 **a)** Find the number of ways that a party of seven persons can arrange themselves : **(05)**
i) In a row of seven chairs
ii) Around a circular table.

b) In how many ways can 5 examinations be scheduled in a week so that no two examinations are scheduled on the same day considering Sunday as a holiday? **(05)**

OR

Q.6 **a)** Out of 12 employees a group of 4 trainees is to be sent for software testing and QA training of one month. **(05)**
i) In how many ways can the 4 employees be selected?
ii) What if there are 2 employees who refuse to go together for training.

b) How many committees of 5 with a given chairperson can be selected from 12 persons? **(05)**

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