



JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), April-May 2015

B. Tech. in Computer Science Engineering, Semester IV

Roll No.....

CSE 402: DISCRETE STRUCTURES

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10

- i. If $A = \{2, 3, 4\}$ then Cardinality of $A \times A \times A$ is
(a) 9 (b) 3 (c) 27 (d) 12
- ii. Which of the following is True:
(a) $n < 2^n$ (b) $n = 2^n$ (c) $2 > n^2$ (d) none
- iii. If f^{-1} is an inverse function of f then the function f^{-1} is :
(a) In-to function (b) Surjection (c) Injection (d) Bijection
- iv. Which of following is not a prime number:
(a) 79 (b) 1 (c) 83 (d) 2
- v. X and Y are two sets, then $X \cup (X \cap Y)$ equal to
(a) X (b) Y (c) ϕ (d) None of these
- vi. In logical connectives the symbol $\vee$ represents:
(a) negation (b) conjunction (c) disjunction (d) none
- vii. Every set of 19 shoes chosen among 18 pairs of shoes contains:
(a) at least 1 matched pair (b) Exactly 1 matched pair (c) No matched pair
(d) 18 matched pair
- viii. Which of the following graph is kuratowski's graph:
(a) K_3 (b) $K_{6,6}$ (c) $K_{3,3}$ (d) $K_{5,5}$
- ix. Which is not a planar graph:
(a) K_3 (b) Q_8 (c) K_5 (d) K_4
- x. Spanning tree of a graph G must have
(a) all the vertices of G (b) all the edges of G (c) all the vertices and edges of G
(d) all the vertices but not all the edges of G

Q.2 Short answer type questions (4 questions @ 2.5 marks) 10

- i. Explain bubble sort and selection sort by suitable examples.
- ii. Define Bipartite graph with suitable examples.
- iii. Write a note on Warshall's Algorithm.
- iv. What are logical connectives? Explain: a) Conjunction b) Disjunction.

Q.3A Define POSET and draw the Hasse Diagram for POSET $(\{1,2,3,5,6,10,15,30\}, /)$. 05

Q.3B State and give two different proofs of the principle of Inclusion and Exclusion, for two sets. 05

Q.4A Determine whether the function :- $F(x) = x^2$ is a bijection from $\mathbb{R}$ to $\mathbb{R}$ or not ? 05

Q.4B Show that the relation on the set of integers $I = \{\dots, -2, -1, 0, 1, 2, \dots\}$, given by $a R b \equiv a$ is congruent to $b \pmod{4}$, is an equivalence relation on the set of integers. 05

Q.5A Define following with example: 05

i) Self complementary graph.

ii) Complete bipartite Graph.

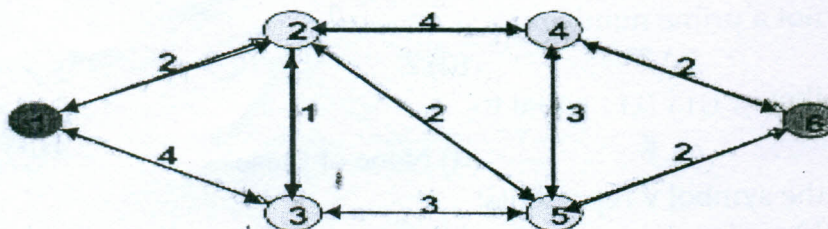
Q.5B A patient is given a prescription of 45 tablets with the instructions to take at least one tablet per day for 30 days. Prove that there must be a period of consecutive day during which the patient takes a total of exactly 14 tablets. 05

Q.6A State and prove Handshaking Theorem. 05

Q.6B Discuss three basic clauses of recursive definition of a Set and define the set of integers as a recursive set. 05

OR

Q.6B Use kruskal's algorithm and find the minimum spanning tree for the following graph:- 05



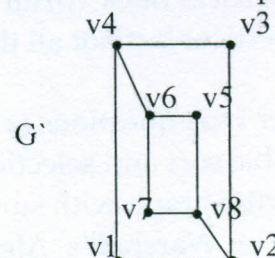
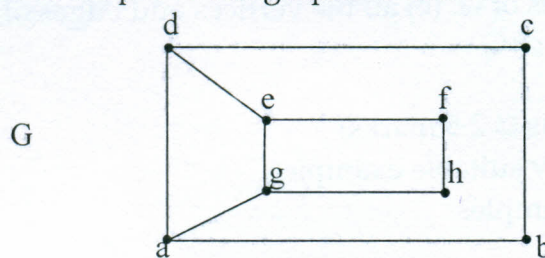
Q.7A If S be a finite set of cardinality n , then show that power set $P(S)$ is a finite set of cardinality 2^n . 05

Q.7B Prove that $K_{3,3}$ is a non planar graph. 05

OR

Q.7B For a connected planar simple graph G , show that $r = e - v + 2$, where r , v and e be the number of regions, vertices and edges respectively. 05

Q.8A Prove or disprove the graphs G and G' displayed below are isomorphic. 10



- Q.9A Draw the Petersen graph, use Kuratowski's theorem and show that the Petersen graph is a non-planar graph. 10
- Q.9B Use Second principle of Mathematical Induction and prove that: 10
 $1^2 + 2^2 + 3^2 + \dots + n^2 = n(n+1)(2n+1)/6$, where n be the positive integral value.
OR
- Q.9B Show that (Division algorithm) : If a, b be integers with $b > 0$. There exists 10
unique integers q and r such that $a = bq + r$ with $0 \leq r < b$.

