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SARDAR PATEL UNIVERSITY

M. Sc. Information Technology (I Semester) Examination

Wednesday, 5th December 2012

2.30 p.m. to 5.30 p.m.

PS01CINT03 : Introduction to Theoretical Computer Science

Total Marks : 70

Q-1 Select appropriate answers from given list of choices. **[08]**

1. Let X be a set with 4 elements. Then P(X) equals
   A. 8
   B. 12
   C. 16
   D. 24
2. A U A' = U is
   A. Associative law
   B. Complement law
   C. Idempotent law
   D. Identity law
3. A Lattice (L, ≤) is called a _____ if it has a greatest element denoted by 1 and a least element denoted by 0.
   A. Grounded Lattice.
   B. Complete Lattice.
   C. Bounded Lattice.
   D. Complemented Lattice.
4. A decline or changes that have occurred in ice-cream sales during November to February is called _____ variation.
   A. Trend.
   B. Seasonal.
   C. Cyclic.
   D. Irregular.
5. A traceable problem has _____
   A. Efficient algorithm to solve problem.
   B. Has method to solve problem
   C. Has data to solve problem
   D. Has graph to solve problem
6. Maximum numbers of edges in simple graph is
   A. n(n-1)/2
   B. n-2
   C. n/n-2
   D. None of these

7 Following graph does not have edges

A. Euler graph
B. Subgraph
C. Regular graph
D. Null graph

8 "Mary is having 90 percent attendance " is example of

A. Crisp logic
B. Fuzzy logic
C. Probable logic
D. None of these

Q-2 Answer the following (any seven) [14]

1. Explain Complement operation of fuzzy logic with example.
2. Explain Complement Subgraph with example.
3. Let A = { φ , b }, construct the following sets:
   1) $A - \varphi$ 2) $\{\varphi\} - A$ 3) $A \cup P(A)$ 4) $A \cap P(A)$.
4. What are the good characteristic of algorithm? Explain through any example
5. Define with an example: Partially Ordered Set(POSET)
6. What are intractable problems? Give example
7. How correctness of algorithm largest can be show where largest algorithm finds largest number among given n numbers?
8. Construct a Truth table for $(P \wedge Q) \vee (P \wedge R)$.
9. Define with an example: Time series

Q-3

A. Define Eulerian paths and circuits. State and prove necessary and sufficient condition for existence of Eulerian paths and circuits. **[6]**

B. 1) Draw a Hasse diagram for S_{30} = {1, 2, 3, 5, 6, 10, 15, 30} whose all the elements are divisors of 30. **[6]**
2) Draw a Hasse diagram of $\langle P(A) , \subseteq \rangle$ for A = { a, b, c }.

OR

B. Explain Lattice, Bounded Lattice and Distributive Lattice. Give suitable example. **[6]**

Q-4

A. Define time complexity of algorithm. Write shortest path algorithm and compute its time complexity. **[6]**

B. Explain Phrase Structure grammar with example. Also explain how phrase structure grammar can be used to specify language. **[6]**

OR

B. Explain properties of Binary relations with suitable example [6]

Q-5

A. Fit a Straight line trend for the following series. Estimate the value for 2014. [6]

Year	2003	2004	2005	2006	2007	2008	2009
Earnings (Rs. Lakhs)	60	72	75	65	80	85	95

B. Explain components and utilities of time series with example. [6]

OR

B. Fit a parabola $Y = a + b X + c X^2$ using given data: [6]

Year	2008	2009	2010	2011	2012
Production('000)	5	7	4	9	10

Estimate the value for 2015.

Q-6

A. What do you mean by fuzzy set operation? Mention any five operations. Explain Composite max-min operation with example. [6]

B. Explain following terms : [6]

(i) Weighted graphs

(ii) Fuzzy relations

(iii) Circuits

OR

B. Write algorithm to find largest number among given n numbers with its time complexity.

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