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Question Paper Code : 86342

M.E. DEGREE EXAMINATION, MAY/JUNE 2016

Second Semester

Computer Science and Engineering

CP 7201 – THEORETICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to M.E. Computer Science and Engineering (with specialization in networks))

(Regulation 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Give a recursive algorithm for computing a^n , where a is a nonzero real number and n is a nonnegative integer.
2. What do you mean by a partial ordering relation ?
3. What is meant by proof of a Theorem ?
4. Write about quantifier in predicate logic.
5. What is normalization in lambda expression ?
6. What is meant by parametric polymorphism ?
7. When is a graph said to be a tree ?
8. Define network on graph.
9. What are the different cases of complexities ?
10. Define Church Turing Thesis.

PART – B (5 × 13 = 65 Marks)

11. (a) Briefly Elaborate the principle of mathematical induction and to prove that $n^3 - n$ is divisible by 3 whenever n is a positive integer. (13)

OR

- (b) Explain in detail about the function and its correspondence in detail. (13)

12. (a) Explain the concept of propositions and its connectives using truth table. (13)

OR

- (b) (i) What is normal form ? Explain the procedure to find disjunctive Normal form. (7)

- (ii) Obtain a disjunctive normal form of $P \vee (7P \rightarrow (Q \vee (Q \rightarrow 7R)))$. (6)

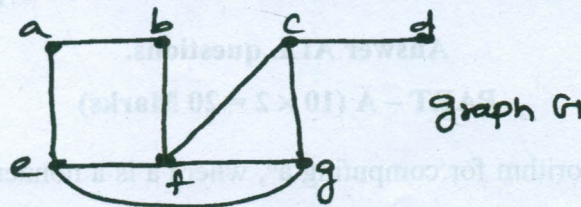
13. (a) Explain lambda notion for basic arithmetic operations, logical operations and recursion. (12)

OR

- (b) Elaborate in detail about functional programming methods and give a coding for printing first 10 Fibonacci numbers in functional expression style. (13)

14. (a) (i) Prove that a simple graph is connected if and only if it has a spanning tree. (6.5)

- (ii) Find a spanning tree of the graph G shown in below figure. (6.5)



OR

- (b) (i) Describe graph terminology and types of graphs in detail. (10)

- (ii) Design network topologies as a graph model. (3)

15. (a) (i) what is an automaton ? Explain the types finite state machines in detail. (7)

- (ii) Construct a DFA which recognizes the set of all strings on $\Sigma = \{a, b\}$ starting with the prefix 'ab'. (6)

OR

- (b) Discuss about computational complexity and decidability in Turing machine and prove that Turing Machine WillHalt (M, w) does not exist. (13)

PART – C (1 × 15 = 15 Marks)

16. (a) Write a prolog program for concatenating strings and trimming a string in all stages. (15)

OR

- (b) Implement Ford-Fulkerson Algorithm for finding maximum flow on given network. (15)