

Code No: 53022

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2015

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE, IT)

Time: 3 hours

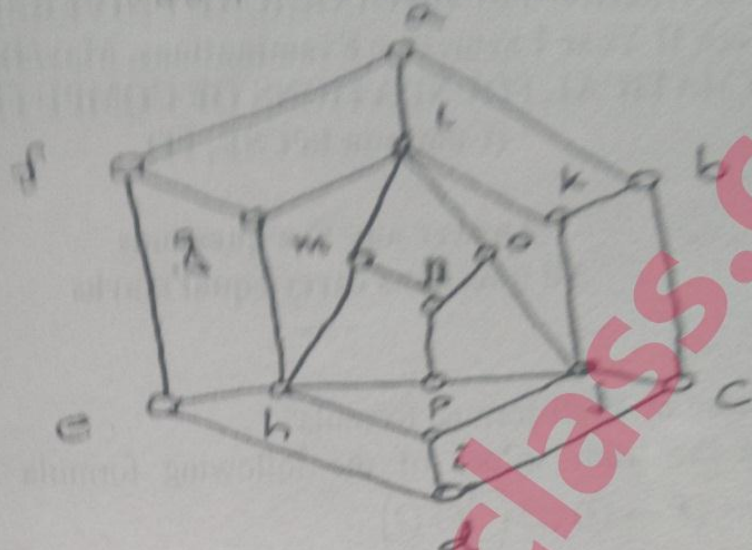
Max. Marks: 75

Answer any five questions  
All questions carry equal marks

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- 1.a) What is meant by Well-formed formula?  
b) Show that the truth values of the following formula is independent of its components.  $(P \rightarrow Q) \Leftrightarrow (\neg PVQ)$ .  
c) Give a note on conjunctive norm form. [5+5+5]
- 2.a) Show that  $P \rightarrow S$  can be derived from the premises  $\neg PVQ, \neg QVR, R \rightarrow S$ .  
b) Write each of the following in symbolic form  
i) All men are good ii) No men are good  
iii) Some men are good iv) Some men are not good. [7+8]
- 3.a) Let  $X = \{1, 2, 3, \dots, 9\}$  and  $R = \{(x, y) / x - y \text{ is divisible by } 3\}$  in  $X$ . Show that  $R$  is an equivalence relation  
b) What is a Lattice? Write its properties. [8+7]
- 4.a) If  $G$  is a group such that  $(ab)^m = a^m b^m$  for three consecutive integers and for all  $a, b \in G$ . Show that  $G$  is abelian.  
b) Define semi group, sub group. Give one example of each. [8+7]
- 5.a) State and explain Pigeon hole principle.  
b) A six person committee composed of Anu; Bhavani, Chaitra, Divya, Eswari, Farhath is to select a chair person, secretary and treasurer.  
i) In how many ways can this be done?  
ii) In how many ways can this be done if either Anu or Bhavani must be chair person?  
iii) In how many ways can this be done if Eshwari must hold one of the officers? [7+8]
- 6.a) Solve  $a_n = a_{n-1} + 3n^2 + 3n + 1$  where  $a_0 = 1$ .  
b) Solve the recurrence relation  $a_n = \sqrt{a_{n-1} + \sqrt{a_{n-2} + \sqrt{a_{n-3} + \sqrt{\dots}}}}$  with  $a_0 = 4$ . [7+8]
- 7.a) Discuss the following terms:  
i) Edge connectivity ii) Vertex connectivity iii) Cut vertex.  
b) Explain the properties of adjacency matrix of a simple graph. Quote suitable example. [8+7]

11) Show that the following graph is not Hamiltonian.



12) Discuss the rules helpful in finding the chromatic number of a graph G. [7+8]

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