

BCST 302/BITT 302

Total No. of printed pages: 2

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Odd Semester Examination 2019-20

B.TECH (III SEM)CSE/IT

DISCRETE STRUCTURE-BCST 302/BITT 302

Time : 3:00 hr

Max. Marks : 100

**Note: Attempt all questions :****Q1. (Attempt any four. All question carry equal marks)****4\*5 = (20 marks)**

Define the following terms:

- Deduction Theorem
- Different types of functions
- Pseudo Boolean Lattices
- Error Correcting Code
- Eulerian and Hamiltonian walk

**Q.2. (Attempt any four. All question carry equal marks)****4\*5 = (20 marks)**

- Show that if any seven points are chosen in a regular hexagon whose sides are of 1 unit, then two of them must be no further apart than 1 unit.
- Determine the number of edges in a graph with 6 nodes, 2 nodes of degree 4 and 4 nodes of degree 2. Draw two such graphs.
- Define injective, surjective and bijective functions. if  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x)=x+2$  and  $g(x)=x^2$ . Find i)  $f \circ g$  ii)  $g \circ f$ .
- Let  $S = \{1, 2, 3, 4, 5\}$  and  $A = S \times S$ . Define the following relation  $R$  on  $A$ :  $(a,b) R(c,d)$  if and only if  $ad=bc$  show that  $R$  is an equivalence relation and compute  $A/R$ .
- Write a program to display factorial of given number. Take input from command line arguments.

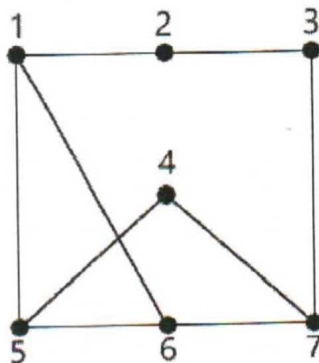
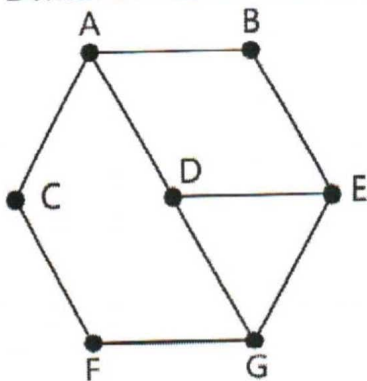
**Q.3. (Attempt any four. All question carry equal marks)****4\*5 = (20 marks)**

- Prove that intersection of any two sub-groups of a group  $(G, *)$  is again a sub-group of  $G$ .
- The mean yield per plot of a crop is 17 kg and standard deviation is 3 kg. If distribution of yield per plot is normal, find the percentage of plots giving yields between 15.5 kg and 20 kg.
- What is the difference between disjoint union (sum) and power sets.
- Explain the following terms:
  - Satisfiability
  - Validity
  - Completeness
- Explain the significance of complete partial ordering, chain, lattice, complete and distributive.

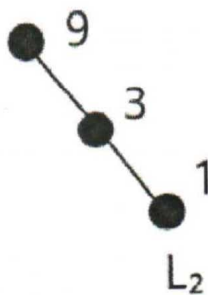
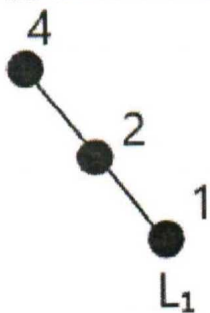
**Q.4. (Attempt any two. All question carry equal marks)**

2\*10= (20 marks)

- a) Show that  $(\neg q \wedge (p \Rightarrow q)) \Rightarrow \neg p$   $(\neg q \wedge (p \Rightarrow q)) \Rightarrow \neg p$  is a tautology.  
 b) Determine whether following graphs are isomorphic



- c) Consider the chain of divisors of 4 and 9, i.e.  $L_1 = \{1, 2, 4\}$  and  $L_2 = \{1, 3, 9\}$  Find the Hasse diagram



of  $L_1 \times L_2$ .

**Q.5. (Attempt any two. All question carry equal marks)**

2\*10= (20 marks)

- a) It was found that in a class, 80 students are passed in English, 60 in Science and 50 in Mathematics. It was also found that 30 students passed in both English and Science, 15 students passed in both English and Mathematics and 20 students passed in both Mathematics and Science, 10 Students passed in all three subjects. If there are 150 students in the class, find
- How many students passed in at least one subject?
  - How many students passed in English only?
  - How many students failed in all three subjects?
- b) Express the following using quantifiers if  $K(x)$ : x is student,  $M(x)$ : x is clever,  $N(x)$ : x is successful.
- There exists a student.
  - Some students are clever.
  - Some students are not successful.
- c) Rewrite the following statements using quantifiers. Write the .negation of these propositions using quantifiers and then rewrite the negation in English:
- At least one student does not live in the hostel.
  - All students live in the hostel.