GIET Main Campus (Autonomous)
Gunupur-765 022

Reg.No.: | | | | | | | | | | | | |

B.TECH. DEGREE EXAMINATION-NOV-DEC-2018
End Semester Examination
BCSBS3040-Discrete Mathematical Structures
(Regulations 2017)

Time : 3 Hours **Maximum : 100 Marks** **Question Code:360812**
Answer ALL Questions

PART A - (10 X 2 = 20 Marks)

1

a) Which of the following is/are tautology? [CO1][PO1]
   a) a v b → b ^ c
   b) a ^ b → b v c
   c) a v b → (b → c)
   d) None of these

b) The rule of inference p, $p \rightarrow q$ then q is known as [CO1][PO1]
   a) Contradiction
   b) Bi-conditional
   c) Modus ponens
   d) d)Modus Tollens

c) The recurrence relation of the Fibonacci sequence is [CO2][PO1]
   a) $f_n = f_{n-1} + f_{n-2}$
   b) $f_n = 2f_{n-1}$
   c) $2f_n = f_{n-2}$
   d) None of these

d) Let A = {1, 2, 3} and let R = {(1, 1), (2, 2), (3, 3), (1, 3), (3, 2), (1, 2)}. Then R is
   a) reflexive and symmetric but not transitive
   b) reflexive and transitive but not symmetric
   c) symmetric and transitive but not reflexive
   d) an equivalence relation [CO2][PO1]

e) Which of these are poset? [CO2][PO1]

a) $(Z, =)$
b) $(Z, \neq)$
c) $(Z, \geq)$
d) None of these

f) If (G, .) is a group, such that (ab)2 = a2 b2 ∀a, b ∈G, then G is a/an

a) commutative semi group
b) abelian group
c) non-abelian group
d) none of these

[CO3][PO1]

g) A self-complemented, distributive lattice is called [CO3][PO1]

a) Boolean algebra
b) Modular lattice
c) Complete lattice
d) Self dual lattice

h) If every element of a group G has its own inverse, then G is [CO3][PO1]

a)abelian
b) finite
c) normal
d) infinite

i) A minimal spanning tree of a graph G is.... ? [CO4][PO1]

a. A spanning sub graph
b. A tree
c. Minimum weights
d. All of above

j) The chromatic number of the graph K_7 is [CO4][PO1]

a) 5
b) 7
c) 8
d) None of these

PART B - (10 X 2 = 20 Marks)

2

a) Write the truth table of $(p \vee q) \rightarrow (p \wedge q)$ [CO1][PO1]

b) Determine the truth table of $(p \vee \neg q) \rightarrow \neg q$ [CO1][PO1]

c) Find out the solution of the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ [CO2][PO1]

d) Define lexico graphic order [CO2][PO1]

e) Let 'S' be a set. Determine greatest and least elements of the poset $(P(S), \subseteq)$ [CO2][PO1]

f) Define abelian group [CO3][PO1]

g) Define cyclic group and generator of cyclic group [CO3][PO1]

h) Show that the intersection of two normal subgroups is normal [CO4][PO1]

i) Define Bi-partite graph and give an example [CO4][PO1]

j) Define Spanning Tree [CO4][PO1]

PART C - (4 X 15 = 60 Marks)

3 a i) Show that the hypothesis "it is not sunny this afternoon and it is colder than yesterday" " we will go to swimming only if it is sunny" " if we do not go to swimming then we will take a canoe trip" and " if will take a canoe trip then we will be home by sunset" leads to the conclusion "we will be home by sunset" [CO1][PO2][8]

ii) Show that $2^n > n^3$ *for* $n \geq 10$ by method of induction. [CO1][PO2][7]

(OR)

b i) Prove that $\sqrt{2}$ is an irrational number by method of contradiction.

[CO1][PO2][7]

ii) Prove that $3+3.5+3.5^2+.....+3.5^n = \frac{3(5^{n+1}-1)}{4}$ whenever n is a non-negative integer by method of induction.

[CO1][PO2][8]

4 a i) Find the solution of the recurrence relation $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ with initial conditions $a_0 = 2, a_1 = 5, a_2 = 15$ [CO2][PO2][8]

ii) Find the Hassae diagram of the poset $(p\{a,b,c\},\subseteq)$. Where p{a,b,c} is the power set of {a,b,c}.And also find the least and greatest elements of it.

[CO2][PO2][7]

(OR)

b i) Use Warshall's algorithm to find the transitive closure of the relation R = {(b,c),(b,e),(c,e),(d,a),(e,b),(e,c) }defined on the set {a,b,c,d,e}.

[CO2][PO2][8]

ii) Use generating function to solve the recurrence relation $a_k = 3a_{k-1} + 4^{k-1}$ *with* int*ial condition* $a_0 = 1$ [CO2][PO2][7]

5 a i) State and prove Lagrange's theorem of finite groups. [CO3][PO2][8]

ii) Show that the kernel of the homomorphism of groups is normal subgroup

[CO3][PO2][7]

(OR)

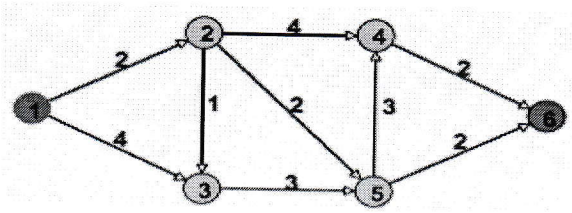
b i) State and prove demorgan's property of distributive lattice [CO3][PO2][7]

ii) Let $E(x_1,x_2,x_3) = \overline{\overline{(x_1 \vee x_2)} \vee (\overline{x_1} \wedge x_3)}$ be a Boolean expression. Find its disjunctive and conjunctive normal forms [CO3][PO2][8]

6 a i) Let G be connected planner simple graph with e edges and v vertices. Let r be the number of regions in a planner representation of G. then show that ' r = e-v+2'

[CO4][PO2][7]

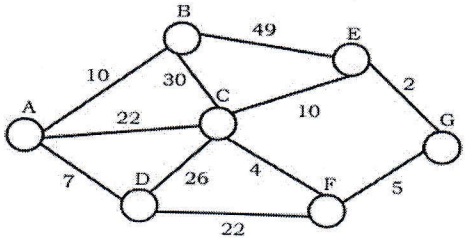
ii) Find the shortest path from the vertex 1 to the vertex 6 by using Dijkstra's algorithm



[CO4][PO2][8]

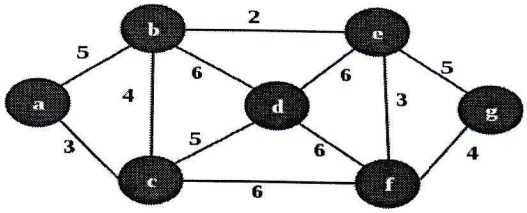
(OR)

b i) Find the minimum spanning tree of the following graph by using Prim's's algorithm.



[CO4][PO2][8]

ii) Find minimum spanning tree by Kruskal's algorithm



[CO4][PO2][7]