PAPER ID-411857

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2021-22
DISCRETE STRUCTURES & THEORY OF LOGIC

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Define semi-group and Abelian Group.
b.	Define pseudo graph and multi graph
c.	Simplify the following Boolean function using k-map: f(x, y, z) =∑ (0,1, 2, 3,4,5,6,7)
d.	Draw the Hasse diagram representing the positive divisors of 18.
e.	What is the contra positive, converse and inverse of the conditional statement=> If you try then you will win.
f.	Find the symmetric closure of the relation R = {(3,3), (2,2), (1, 3), (2, 1)} on A = {1, 2, 3, 4}
g.	Find the power set of each of these sets, where a and b are distinct elements. 1. {a, b} 2. {{a},b}

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	The function f :R->R defined as f(x)=2x+3 for all x€R is both injective and surjective function. Also find $f^{-1}(x)$
b.	Show that the set of all positive rational numbers forms an abelian group under the composition defined by a*b= (ab)/4.
c.	Distinguish between distributed lattice and complemented lattice with suitable example.
d.	Find whether the following argument is valid or not. (1)No Engineering student is bad in studies. Abhishek is not bad in studies. Therefore Abhishek is an engineering student. (2)All dogs are carnivorous. Some animals are dogs. Therefore some animals are carnivorous.
e.	Explain chromatic number of a graph. Examine the chromatic no. for bipartite graph ($K_{4,5}$) and complete graph (K_{20}).

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a)	By using mathematical induction prove that the given equation is true for all positive integers. 2 + 4 + 6 + …. + 2n = n(n+1)
(b)	If R is the relation on the set of integers such that (a,b) €R iff 3a+7b=7n for some integer n. Prove that R is an equivalence relation.

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2021-22
DISCRETE STRUCTURES & THEORY OF LOGIC

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Show that the set {0,1,2,3,4,5,6} is group under addition Modulo 7 .
(b)	If the order of an element a of a group is n and p is prime to n then the order of a^p is n.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain lattice. Determine whether (P (S), ⊆) is a lattice where S is a set {2, 4, 6}. Find last element, first element, minimal element & maximal element.
(b)	Simplify the following Boolean function using three variables maps: (a) f(x,y,z,u)=∑(0,1,5,7,9,11) (b) f(x,y,z,u)=π(1,2,3,5,7)

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Construct the truth table for the following statements and find which statement is tautology, contradiction and contingency: (i) (P→Q)→R' (ii) P↔(P'∨R')
(b)	Suppose that the statement p → ¬q is false. Find all combinations of truth values of r and s for which (¬q → r) ∧ (¬p ∨ s) is true.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain the following terms. Give one suitable example for each 1) Euler Path 2) Hamiltonian Path 3) Null Graph 4) Circuit 5) Bipartite Graph
(b)	Find the recurrence relation for the Fibonacci sequence.