WINTER – 2022

UNIT-1

Q.1 a) Show that $\neg(p \vee(\neg p \wedge q))$ and $(\neg p \wedge \neg q)$ are logically equivalent by developing a series of logical equivalence. **(6)**

b) Let p(x) be the statement "x spends more than five hours every weekday in class", where the domain for x consisit of all students. Express each of these qualifications in English

i) $\exists x\ p(x)$ **ii)** $\forall x\ p(x)$

iii) $\exists x \neg p(x)$ **iv)** $\forall x \neg p(x)$ **(7)**

Q.2 a) Use rules of inference to show that if $\forall x(p(x) \rightarrow (Q(x)))$ and $\forall x(p(x) \wedge R(x))$ are true then $\forall x(R(x) \wedge s(x))$ is true **(6)**

b) Determine whether each of the following form is a tautology or a contradiction or neither **(7)**

i) $(P \wedge Q) \rightarrow (P \vee Q)$

ii) $(P \vee Q) \wedge (\neg P \wedge \neg Q)$

iii) $(\neg P \wedge \neg Q) \rightarrow (P \rightarrow Q)$

iv) $(P \rightarrow Q) \wedge (P \wedge \neg Q)$

v) $[P \wedge (P \rightarrow \neg Q) \rightarrow Q]$

UNIT-2

Q.3 a) Use a Venn diagram to illustrate the relationships **(6)**

i) $A \subset B$ and $B \subset C$

ii) The set of all months of the year whose names do not contain the letter R in the set of all months of the year

b) What are the Cartesian product

i) AxCxC, **ii)** AxB

iii) BxC **iv)** A^3

Where A = {0,1}, B = {1,2} and C = { 0,1,2} **(8)**

Q.4 a) Define with example. **(14)**

i) Union **ii)** Intersection

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iii) Disjoint **iv)** Differnece
v) Complement **vi)** Subset
vii) Power set

UNIT-3

Q.5 a) Design a composition table for algebraic system (Z_6 + 6) & (Z_6,*6) **(6)**

b) Show that, the set of all integers is a group with respect to addition. **(7)**

Q.6 a) Show that p(s), ∪) & p(s),∩ are Moniod, Where, S = non empty set and p(s) = power set of S set & also draw composition table for ∪&∩. **(13)**

UNIT-4

Q.7 a) Find the sum of product expansion for the function $F(x,y,z) = (x+y)\ \bar{Z}$ **(6)**

b) Construct circuits that produce the following outouts **(7)**

i. $(x + y)\ \bar{x}$

ii. $\bar{x}(\overline{y + z})$

iii. $(x + y + z)\ (\bar{x}\bar{y}\bar{z})$

Q.8 a) Find the k- map for **(7)**

i. $xy + \bar{x}\bar{y}$

ii. $x\bar{y} + \bar{x}\bar{y}$

iii. $\bar{x}\bar{y} + \bar{x}y + \bar{x}\bar{y}$

b) Find the complement of every element of lattics (S ∩D) for ∩ = 75, where D denote the relation of divisor **(6)**

UNIT-5

Q.9 a) Write is the value of the prefix expression

(+ - * 235 /↑ 234)? **(6)**

b) Explain Huffman code algorithm with example. **(7)**

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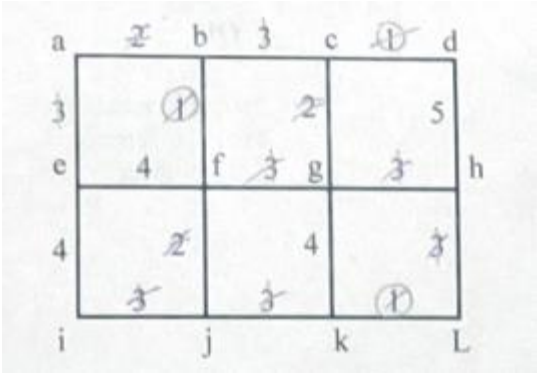
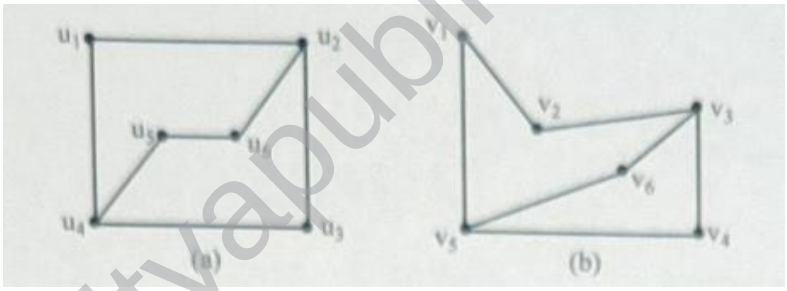
Q.10 Use prim's & Krushal's algorithm to find minimum spanning tree in the weighted graph shown in figure **(13)**



UNIT-6

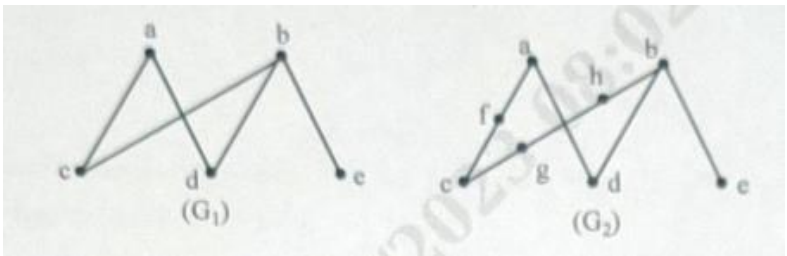
Q.11 a) Explain sufficient and necessary condition For Euler circuits and paths. **(7)**

b) Determine whether these two graphs are isomorphic **(7)**



Q.12 a) what is graph? Explain different types of graph with example **(7)**

b) Show that the graph G_1 and G_2 are all homeomorphic **(7)**



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