BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - III Computer Science & Engineering : WINTER- 2022
SUBJECT : DISCRETE MATHEMATICAL STRUCTURES

Day : Friday | Time : 10:00 AM-01:00 PM
Date : 09-12-2022 | **W-25311-2022** | Max. Marks : 60

N.B.
1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable calculator is **ALLOWED.**
4) Assume suitable data if necessary.

Q.1 Using the information given, write the following English sentence in symbolic form: **(10)**

a) The sum of any two integers is an odd integer.
b) Every integer is even or prime.
c) Every integer is an odd integer.

Also find CNF and DNF for the following:

i) $(p \rightarrow q) \wedge (q \rightarrow p)$
ii) $((p \wedge (p \rightarrow q)) \rightarrow q)$

OR

Define power set with example and prove by mathematical induction $x^n - y^n$ is divisible by $x-y$.

Q.2 A survey of 500 television watches produced the following information. **(10)**
285 watch football, 195 watch hockey, 115 watch basket ball, 45 watch football and basket ball . 70 watch football and hockey, 50 watch basket ball and hockey, 50 do not watch any kinds of games find:

i) How many watch all 3 kinds of games?
ii) How many watch exactly one of the sport languages?
iii) Draw Venn diagram showing results of the survey.

OR

Define set and explain various set operations with example and solve, Let P and Q be two multisets, $P = \{a, a, a, c, d, d\}$ and $Q = \{a, a, b, c, c\}$ find :
i) $P \cap Q$ ii) $P \cup Q$ iii) $P - Q$ iv) $P + Q$

Q.3 Define reflexive closure, symmetric closure and transitive closure with suitable example. **(10)**
Let R be a relation on set $S = \{a,b,c,d,e\}$ given as, $R = \{(a,a), (a,d), (b,b), (c,d) (c,e), (d,e), (e,b), (e,e)\}$
Find transitive closure using Warshall's algorithm.

OR

Define equivalence class with suitable example and show that, the relation $R = \{(x,y) | x-y$ is divisible by 4 where x, y are integers$\}$ is an equivalence relation. Write equivalence classes given by R.

Q.4 Define the following term with suitable example: **(10)**

a) Homorphism of group
b) Automorphism of group and show that, $(G/N, *)$ is a group

OR

In any Ring $(R+.)$ prove that,

a) The zero element Z is unique.
b) The additive inverse of each ring element is unique.

Also show that, if $f: G \rightarrow G'$ is an isomorphism then $f^{-1}: G' \rightarrow G$ is also an isomorphism.

P.T.O.

Q.5 Suppose license plate contains 3 English letters followed by 4 digits. **(10)**

a) How many different license plates can be manufactured if repletion of letters of letters and digits are allowed.

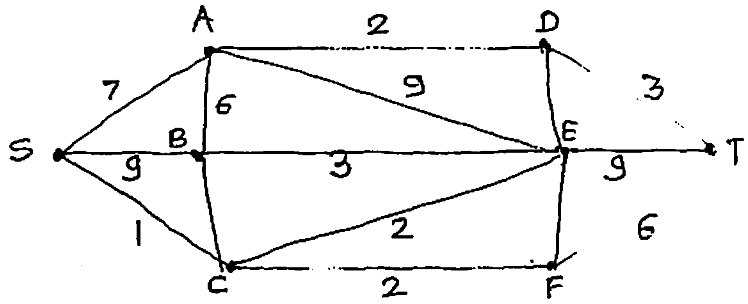
b) How many plates are possible if only the letters are repeated?

c) How many plates if only digits are repeated?

OR

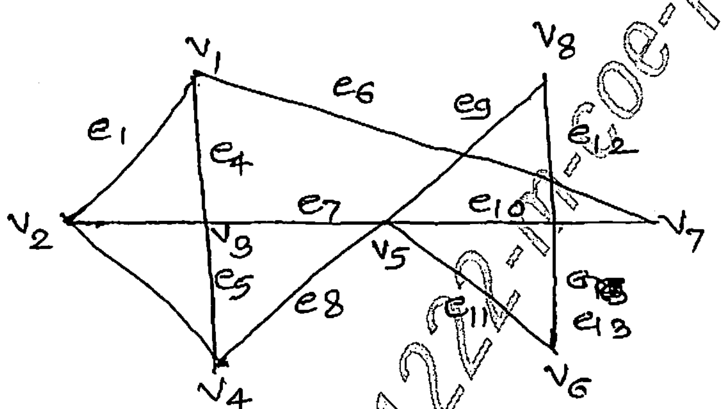
In how many ways can seven men and women sit down at a round table in such a way that no two men sit next to each other.

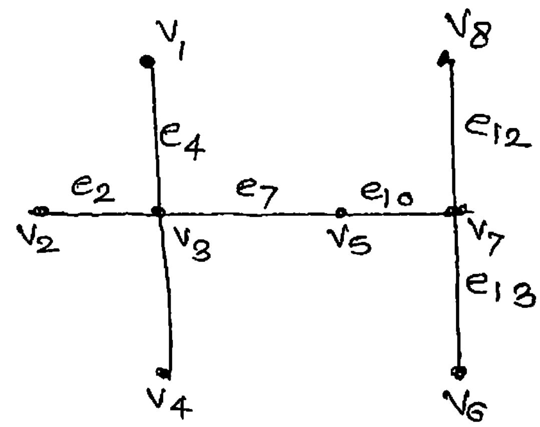
Q.6 Explain Priims algorithm. Using Kruskal's algorithm construct minimal spanning tree. **(10)**



OR

Find the fundamental system of system of cut sets for the graph G below w.r.t spanning Tree T.





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