UNIT-IV

8. a. Consider the group G = {1, 2, 3, 4, 5, 6} under multiplication modulo 7 **7M**

i) Find the multiplication table of G.

ii) Find the subgroups and their orders generated by 2 and 3.

b. Define Normal subgroup. Show that a subgroup (H, *) of a group (G, *) is a normal subgroup if and only if $a^{-1} * h * a \in H$ for every $a \in G$ and $h \in H$. **8M**

(or)

9. a. i) Let G be a simple group all of whose vertices have degree 3 and $|E| = 2|V|-3$. What can be said about G?

ii) Is there a simple graph with degree sequence (1, 1, 3, 3, 3, 4, 6, 7)? Justify. **7M**

b. Define isomorphism and explain with suitable example. **8M**

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

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, MARCH, 2021

Third Semester

INFORMATION TECHNOLOGY

17IT3302 DISCRETE MATHEMATICS FOR INFORMATION TECHNOLOGY

Time: 3hours ***Max. Marks: 70***

Part-A is compulsory

Answer One Question from each Unit of Part-B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define proposition.
   b. Define sum rule principle.
   c. What is ordered pair?
   d. Define recursive function.
   e. Define homomorphisms.
   f. What is the generating function for the sequence 1, 6, 16, 216,….?
   g. How many ways the sum can be obtained of 6 when two indistinguishable dice are rolled?
   h. State Pigeonhole principle.
   i. State any two properties of a group.
   j. Define sub graph.

PART-B

4 x 15 = 60M

UNIT-I

2. a. Show that $p \leftrightarrow q$ and $\neg p \leftrightarrow \neg q$ are logically equivalent. **7M**

   b. Translate the given statements into propositional logic using the propositions provided:

   P: "The message is scanned for viruses".

   Q: 'The message was sent from an unknown system".

   i) "The message is scanned for viruses whenever the message was sent from an unknown system".

   ii) "It is necessary to scan the message for viruses whenever it was sent from an unknown system". **8M**

(or)

3. a. Show that $p \rightarrow q$ and $\neg q \rightarrow \neg p$ are logically equivalent. **7M**

   b. Show that among any 4 numbers, one can find 2 numbers so that their difference is divisible by 3. **8M**
   (Avoid considering the cases separately. Use Pigeonhole principle).

UNIT-II

4. a. Let P(A) be the power set of any non empty set A. Prove that the relation Í of set inclusion is not an equivalence relation. **7M**

   b. If R is an equivalence relation on a set A, then R^{-1} is also an equivalence relation on A. Prove. **8M**

(or)

5. a. Define relation. Discuss types of relations with suitable examples. **7M**

   b. Find the generating functions for the following sequences. In each case, try to simplify the answer.
   (a) 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, …
   (b) 1, 1, 1, 1, 1, … **8M**

UNIT–III

6. a. Find the unique solution to the following recurrence relation with the given initial conditions:

   $a_n = 9a_{n-1} - 27a_{n-2} + 27a_{n-3}$ with $a_0 = 5$, $a_1 = 24$, $a_2 = 117$ **8M**

   b. Show that any subgroup of a cyclic group (G, *) is cyclic. **7M**

(or)

7. a. Let S = R-{-1} and * is defined as a*b = a + b + ab. Show that (S, *) is a group. **7M**

   b. Find the particular solution of the recurrence relation
   $a_{n+2} - 4\,a_{n+1} + 4\,a_n = 2^n$. **8M**