Q.P. Code: 18HS0836 **R18**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations March-2021

DISCRETE MATHEMATICS

(Common to CSE & CSIT)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1 **a** Define tautology and contradiction with an example. **2M**

b If $f: R \to R$ be defined by $f(x) = \frac{2x+3}{5}$, then find its inverse function. **2M**

c How many different words can be formed with the letters of the word MISSISSIPPI? **2M**

d Determine the coefficients of x^{15} in $x^3(1-2x)^{10}$ **2M**

e What is in-degree and out-degree of a graph? Illustrate with an example. **2M**

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2 **a** Show that $S \vee R$ is tautologically implied by $(P \vee Q) \wedge (P \to R) \wedge (Q \to S)$. **5M**

b Show that $\sim P$ is a valid conclusion from the premises $\sim(P \wedge \sim Q), \sim Q \vee R, \sim R$. **5M**

OR

3 **a** Show that $(\forall x)(P(x) \to Q(x)) \wedge (\forall x)(Q(x) \to R(x)) \Rightarrow (\forall x)(P(x) \to R(x))$. **5M**

b Obtain the principle conjunctive normal form of the statement $(\sim P \to R) \wedge (Q \leftrightarrow P)$. **5M**

UNIT-II

4 **a** Define a binary relation with an example. Let R be the relation from the set $A = \{1, 3, 4\}$ on itself such that $R = \{(1, 1), (1, 3), (3, 3), (4, 4)\}$ then find the matrix of R and draw the graph of R. **5M**

b Prove that the set Z of all integers with the binary operation *, defined as $a * b = a + b + 1, \forall a, b \in Z$ is an abelian group. **5M**

OR

5 **a** Let $P(A)$ be a power set of A and $\subseteq$ be the inclusion relation on the elements of $P(A)$. Construct the Hass diagram of $(P(A), \subseteq)$ for (i). $A = \{a, b, c\}$ and (ii). $A = \{1, 2, 3, 4\}$. **5M**

b If $f, g: R \to R$ be defined by $f(x) = 2x + 1$ and $g(x) = \frac{x}{3}$, then verify $(g o f)^{-1} = f^{-1} o g^{-1}$. **5M**

UNIT-III

6 a Out of 80 students in a class, 60 play foot ball, 53 play hockey and 35 both the games. How many students (i) do not play of these games? (ii) Play only hockey but not foot ball. **5M**

b Find how many integers between 1 and 60 that are divisible by 2 nor by 3 and nor by 5. Also, determine the number of integers divisible by 5 not by 2, not by 3. **5M**

OR

7 a In how many ways can the letters of the word COMPUTER be arranged? How many of them begin with C and end with R? how many of them do not begin with C but end with R? **5M**

b Find the minimum number of students in a class to be sure that 4 out of them are born on the same month? **5M**

UNIT-IV

8 **a** Solve the recurrence relation $a_{n+2} - 2a_{n+1} + a_n = 2^n$ with the initial conditions $a_0 = 2,\ a_1 = 1$. **5M**

b Solve the equation $a_n - 7a_{n-1} + 10a_{n-2} = (4)^n$. **5M**

OR

9 **a** Use generating functions to solve $a_n - 5a_{n-1} + 6a_{n-2} = 2^n$ for $n > 2$ with the initial conditions $a_0 = 1,\ a_1 = 1$. **5M**

b Solve $a_n = a_{n-1} + 2a_{n-2},\ n > 2$ with the initial conditions $a_0 = 2,\ a_1 = 1$. **5M**

UNIT-V

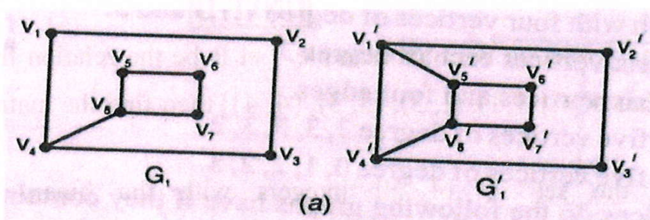
10 **a** A graph G has 21 edges, 3 vertices of degree4 and the other vertices are of degree 3.Find the number of vertices in G? **5M**

b What is the maximum possible number of edges in a simple graph G with n-vertices and hence prove it? **5M**

OR

11 **a** Find the chromatic polynomial & chromatic number for $K_{3,\,3}$. **5M**

b Define graph isomorphism. Is the following pair of graphs are isomorphic to each other? **5M**



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