

Model Question Paper

Subject Code: CS/IT/CM/CD/CO- 212 (R20)

R.V.R. & J.C. College of Engineering, Guntur – 522019

(Autonomous)

B.Tech. Semester-III [Second Year] Degree Examination

Subject Name: Discrete Mathematics

Time: Three Hours

Answer Question No.1 compulsorily.

Answer ONE question from each unit.

Maximum : 60 Marks

(1X14 = 14 Marks)

(4X14=56)

1. Define the following:

(14X1=14 Marks)

- a) $(P \vee \neg P)$ is a tautology or contradiction? [CO-1] [L3]
- b) Give the generating function $A(X)$ for the sequence $a_n = (n+1)$? [CO-3] [L3]
- c) In how many ways can 10 people arrange themselves in a ring? [CO-2] [L3]
- d) Find the number of arrangements of the letters of TALLAHASSEE. [CO-2] [L3]
- e) State the Euler's theorem? [CO-4] [L2]
- f) Give the chromatic number for Cycle if the length is even? [CO-4] [L1]
- g) What is meant by Bi - partite graph? [CO-4] [L1]
- h) What is the difference between tree and graph? [CO-4] [L4]
- i) Solve the recurrence relation using substitution: $a_n = a_{n-1} + n$ where $a_0 = 2$. [CO-3] [L4]
- j) Show that 3 and 24 integers are congruent modulo 7 ? [CO-4] [L4]
- k) What is an Equivalence Relation? [CO-1] [L1]
- l) State the law of hypothetical syllogism? [CO-1] [L1]
- m) Let $A = \{1, 2, 3\}$ $P(A)$ be the power set of A. List $P(A)$. If $P(A)$ has 256 elements, how many elements are there in A? [CO-1] [L3]
- n) How many binary sequences are there of length 15 with exactly six 1's. [CO-2] [L3]

UNIT – I

2. Show that the following are equivalent formulas:

- a) $[P \vee (P \wedge Q)] \leftrightarrow P$ (Using truth table) [7 M] [CO-1] [L3]
- b) $[P \vee (\neg P \wedge Q)] \leftrightarrow P \vee Q$ (Using rules of propositions) [7 M] [CO-1] [L3]

(OR)

3. a) Use Principle of Mathematical Induction to Prove that : $3n^5 + 5n^3 + 7$ where n is Divisible by 15 for each +ve integer.

[7 M] [CO-1] [L3]

b) Prove (or) disprove the validity of the following argument (Using Rules of Inference)

Every living thing is a Plant or animal.

[7 M] [CO-1] [L3]

David's dog is alive and it is not a plant.

All animals have hearts.

Hence, David's dog has a heart.

UNIT – II

4. a) How many integral solutions are there of $x_1+x_2+x_3+x_4+x_5=30$ where for each i [7 M] [CO-2] [L3]
 i) $x_i \geq 0$ ii) $x_i > i$ iii) $x_1 \geq 2, x_2 \geq 3, x_3 \geq 4, x_4 \geq 2, x_5 \geq -3$.

- b) Enumerate the number of nonnegative integral solutions to the inequality [7 M] [CO-2]

[L3]

$$x_1+x_2+x_3+x_4+x_5 \leq 19.$$

(OR)

5. a) In How many ways can the committee of 5 teachers and 4 students be chosen from 9 teachers and 15 students if teacher A refuses to serve if student B is on the committee? [7 M] [CO-2] [L3]

- b) In how many ways can 10 people arrange themselves i) In a row of 10 chairs? ii) In a row of 7 chairs? iii) In a circle of 10 chairs? [7 M] [CO-2] [L3]

UNIT – III

6. Solve the following recurrence relations:

- a) $a_n - 7a_{n-1} + 16a_{n-2} - 12a_{n-3} = 0$ where $a_0=1, a_1=4, a_2=8$ (using characteristic roots). [7 M] [CO-3]

[L3]

- b) $a_n - 6a_{n-1} = 0$ where $a_0=1$. (Using Generating Functions Method) [7 M] [CO-3] [L3]

(OR)

7. a) Find the coefficient of X^{12} in [7 M] [CO-3] [L4]

$$\frac{1-X^4-X^7+X^{11}}{(1-X)^5}$$

- b) Find the coefficient of X^{25} in $(X^2+X^3+X^4+X^5+X^6)^7$ [7 M] [CO-3] [L4]

UNIT – IV

8. a) Find the Chromatic - Number for the “Wheel” graph? [7 M] [CO-4]

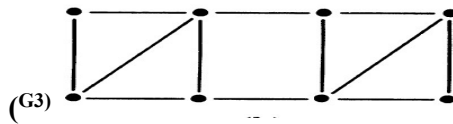
[L4]

- b) Define the Hamiltonian Path and Hamiltonian Cycle and also write the rules.

Determine whether the graph (G3) is Hamiltonian or not?

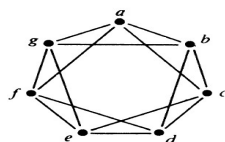
[7 M] [CO-4]

[L3]

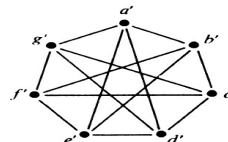


(OR)

9. a) What is meant by Isomorphism? Determine whether the following graphs G1 and G2 Isomorphic or not? [7 M] [CO-4] [L3]



(G1)



(G2)

- b) Draw the Hasse - diagram for the poset [D12; /]. Where '/' is the divisibility relation.

Determine this POSET is lattice or not

[7 M] [CO-4] [L4]