

This question paper contains 4 printed pages]

Roll No. _____

Sl.No.

232

B.C.A. (Part - II)

B.C.A. (Part - II) EXAMINATION, 2017

(Faculty of Science)

(Three - Year Scheme of 10+2+3 Pattern)

Paper-232

DISCRETE MATHEMATICS

Time : Three Hours]

[Maximum Marks : 100

Answer of all the questions (short answer as well as descriptive) are to be given in the main answer -book only. Answers of short answer type questions must be given in sequential order. Similarly all the parts of one question of descriptive part should be answered at one place in the answer-book. One complete question should not be answered at different places in the answer-book. Write your roll numbers on question paper before start writing answers of questions.

Part I: (Very short answer) consists of 10 questions of 2 marks each. Maximum limit for each question is up to 40 words.

Part II: (Short answer) consists of 5 questions of 4 marks each. Maximum limit for each question is up to 80 words.

Part III: (Long answer) consists of 5 questions of 12 marks each with internal choice.

PART-I

1. a) Convert following into decimal form
 - i) $(110011)_2$
 - ii) $(1101)_2$
- b) Convert the octal number 12.36 into binary form.
- c) Define complement of a set.
- d) Define partial order Relation.
- e) Make a truth table for the statement $(p \wedge q) \Rightarrow (p \vee q)$
- f) Define Regular graph and Bipartite graph.

- g) Expand $\left(x + \frac{1}{x}\right)^n$ by binomial theorem.
- h) If 'a' and 'b' are two element of Boolean Algebra then $(a.b)^1 = a^1 + b^1$.
- i) Draw a graph having Hamiltonian circuit.
- j) What is sub-tree.

PART-II

2. Convert following decimal into Binary.

- a) $(1024)_{10}$
 b) $(36.125)_{10}$

3. Find the terms independent of x in the expansions of $\left(3x^2 + \frac{1}{3x}\right)^n$.

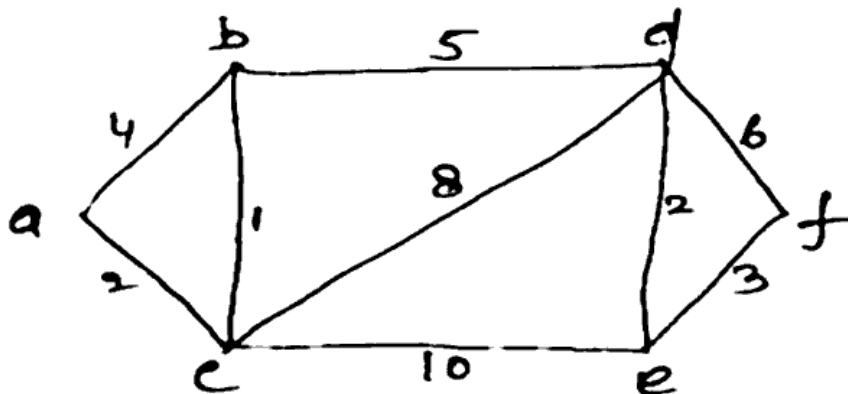
4. Prove that.

$$5 + 5^2 + 5^3 + \dots + 5^n = \frac{5}{4}(5^n - 1)$$

5. Find the following recurrence relation.

$$C_n = 2C_{n-1} + 1, n > 1 \text{ and } C_1 = 1$$

6. Find the shortest path between the vertices 'a' and 'f' in the following weighted graph.



EXERCISE-III

7. a) Compute the sum of-
- $(101101)_2 + (110011)_2$
 - $(11001)_2 + (11011)_2 + (11111)_2$
- b) Compute $(436)_{10} + (51)_{10} = (\quad)_2$
- c) Subtract the binary number 1010101 from 11100101.

OR

- a) Convert the number $(5AC)_{16}$ into binary form.
- b) Multiply $(11011)_2$ by $(111)_2$
- c) Find the middle term in the expansion of $\left(\frac{x}{2} - \frac{y}{3}\right)^8$

8. Prove that-

- a) $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$
- b) $5^{2n-2} - 24n - 25$, is divisible by 576 $\forall n \in \mathbb{N}$.

OR

- a) Find the coefficient of x^3 in the expansion of the product $(1+2x)^6(1-x)^7$.
- b) $(11)^{n-2} + (12)^{2n-1}$ is divisible by 133 $\forall n \in \mathbb{I}$.
- c) By the principle of mathematical induction prove that

$$7+77+777+\dots+777\dots7(n \text{ digit}) = \frac{7}{81} (10^{n+1} - 9n - 10), n \in \mathbb{N}.$$

9. a) Using property of set, Prove that-

- $A \cup (A \cap B) = A$
- $A \cap (A \cup B) = A$

b) Define

- one-one function
- onto function

c) If $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = 2x + 7$, find the inverse of f .

OR

a) Prove that function $f: \mathbb{Q} \rightarrow \mathbb{Q}$ given by $f(x) = 2x - 3$ for all $x \in \mathbb{Q}$ is a bijection.

- b) On the set Q^+ of positive rational, binary operation are defined as following

$$a * b = \frac{ab}{3} \quad \forall a, b \in Q^+$$

Prove that the operation are commutative and Associative.

10. a) Show that the compound statement $(p \vee q) \wedge (\sim p \wedge \sim q)$ is a contradiction.
 b) Construct a truth table for compound proposition $\sim p \rightarrow (q \rightarrow r)$.

OR

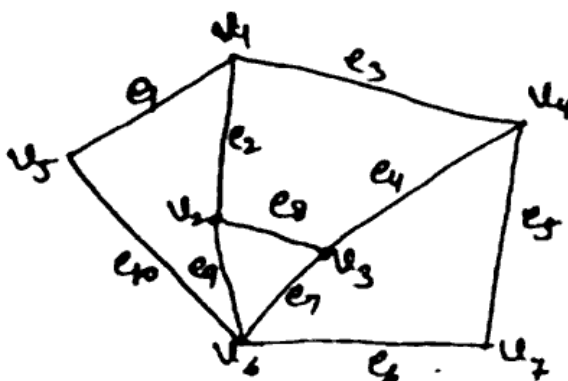
- a) If p, q, r are any three statement, then show that $((p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r)) \rightarrow r$ is a tautology.
 b) If B be Boolean Algebra and $a, b, \in B$ then
 i) $a + a \cdot b = a$
 ii) $a \cdot (a + b) = a$

11. Define any three with example

- a) Isomorphic Graph
 b) Walk
 c) Hamiltonian Graph
 d) Complete Binary tree
 e) Complete Graph

OR

Incident Matrix and Adjacency Matrix of following Graph



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