

Seat No.	
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**B.C.A (Semester - I) (CBCS) Examination Mar/Apr-2018
DISCRETE MATHEMATICS**

Time: 2½ Hours

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

Q.1 Choose and write a correct answer from given alternative. 14

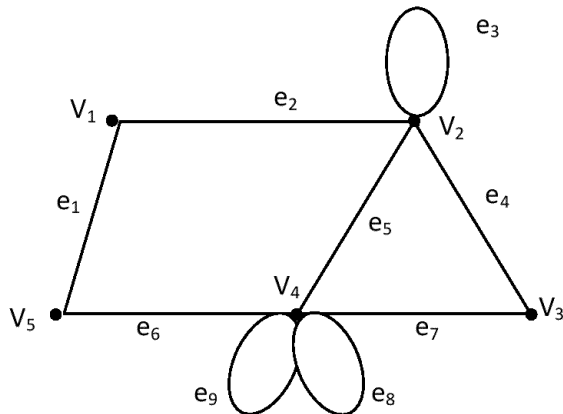
- 1) If all the entries of given statement pattern are 'T' then it is called as _____.
a) Contradiction b) Tautology
c) Contra positive d) Contingent
- 2) If aRb and $bRa \Rightarrow a = b$ then relation R is called as _____ relation.
a) Antisymmetric b) Symmetric
c) Reflexive d) Transitive
- 3) If $A = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ then $|A| =$ _____.
a) 12 b) 14
c) 10 d) 11
- 4) If $|A| = 12$, $|B| = 7$ if A & B are disjoint sets. Then $|A \cup B| =$ _____.
a) 19 b) 20
c) 0 d) 5
- 5) A set having only one element is called as _____.
a) Power set b) Disjoint set
c) Empty set d) None of these
- 6) The converse of statement $p \rightarrow q$ is _____.
a) $p \rightarrow q$ b) $q \rightarrow p$
c) $\sim p \rightarrow \sim q$ d) $\sim p \cap \sim q$
- 7) Complement of null graph is _____.
a) Complete graph b) Null graph
c) Simple graph d) None of these
- 8) If $A = \{0, 1, 2, 3, 4, \}$, $B = \{0, 1, 3, 5, 6, 7\}$. Then $|A \cup B| =$ _____.
a) 7 b) 8
c) 11 d) 0
- 9) If $A \cap B = \phi$ then A & B are _____ sets.
a) Disjoint b) Null
c) Identical d) Reflexive
- 10) If graph G contains 4 vertices & g edges then order of its adjacency matrix is _____.
a) 4×9 b) 4×4
c) 9×4 d) 9×9
- 11) If $f(x) = x^2 + 2x + 1$, then $f(2) =$ _____.
a) 9 b) -8
c) 4 d) 2

- 12) A graph without loop and parallel edge is called as _____.
 - a) Null graph
 - b) Disjoint graph
 - c) Simple graph
 - d) Multi graph
- 13) Graph K_8 is _____ regular graph.
 - a) 8
 - b) 7
 - c) 6
 - d) 5
- 14) The statement $P \vee \sim (P \cap q)$ _____.
 - a) Contradiction
 - b) Tautology
 - c) Contingency
 - d) None of the above

Q.2 Answers to the following. [Any seven]

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- a) If $|U| = 15$, $|A| = 7$, $|B| = 5$ & $|A \cap B| = 3$ find $|A \cup B|$ and $|(A \cup B)^c|$
- b) Write the converse and inverse of statement:-
“If man is rich then he is happy”
- c) If $A = \{1, 2, 3, 5, 7, 9, 10\}$ and $B = \{2, 3, 4, 7, 8, 10, 11\}$ find $A - B$ and $B - A$.
- d) State the Inclusion - Exclusion principle for two sets.
- e) Find ‘a’ if $f(x) = ax - 2$ and $f(2) = 4$.
- f) Consider following graph. (G)



Draw the graph $G - V_1$ and $G - \{e_3, e_5, e_6\}$

- g) Define union of two sets.
- h) Define complete graph with example.
- i) If $A = \{1, 2\}$ find $p(A)$.

Q.3 A) Attempt any two of the following.

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- 1) Let $R = \{(a, a), (a, b), (a, c), (b, c), (c, b)\}$ be the relation defined on set $A = \{a, b, c\}$. Draw the digraph of relation R. find in degree and out degree of each vertex.
- 2) If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ be Universal set $A = \{1, 2, 4, 6, 7, 9\}$ and $B = \{2, 3, 7, 8, 10\}$. Verify that
 - i) $(A \cup B)^c = A^c \cap B^c$
 - ii) $(A \cap B)^c = A^c \cup B^c$
- 3) A function $f: R \rightarrow R$ defined by $f(x) = \frac{3x-11}{7}$, for $x \in R$, show that function is one- one and onto.

B) Prove that $p \cap (q \vee r) \equiv (p \cap q) \vee (p \cap r)$.

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Q.4 Attempt any two of the following.

a) How many integers between 1 to 567 which are divisible by 3 or 5 or 7?

b) Test the validity of following argument by truth table.

$$p \rightarrow q, q \rightarrow r \vdash p \rightarrow r$$

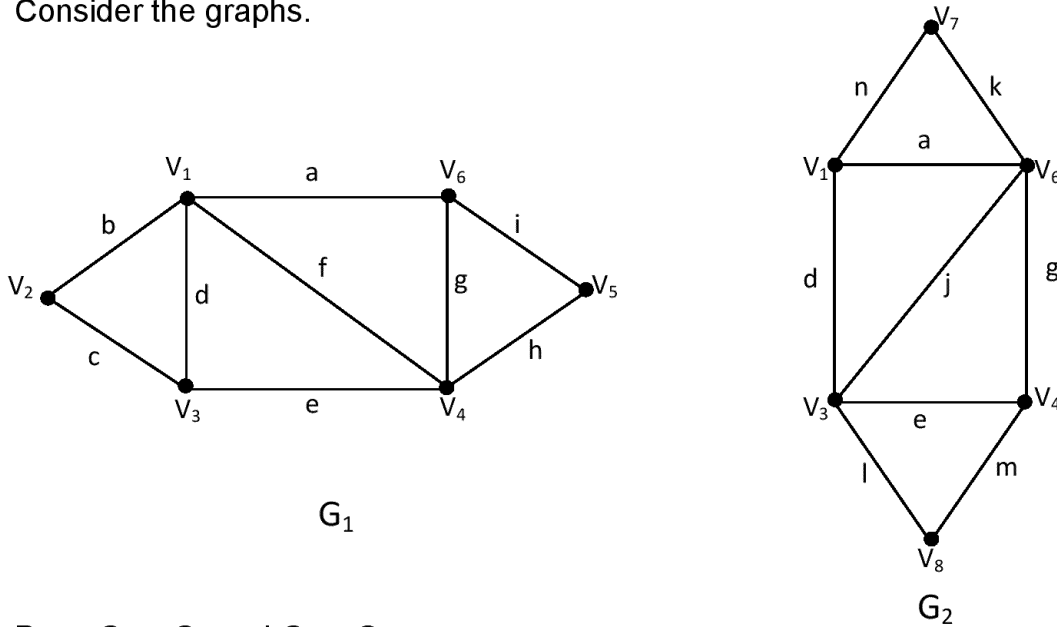
c) Define transitive closure R^* .

If $R = \{(1, 1), (1, 2), (1, 3), (2, 3), (3, 1), (3, 2)\}$ be the relation on set $A = \{1, 2, 3\}$ find transitive closure R^* by Warshall's Algorithm.

Q.5 Answer the following. (Any 2)

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a) Consider the graphs.



Draw $G_1 \cup G_2$ and $G_1 \cap G_2$

b) Consider $U = \{x \mid x \in N, x \leq 12\}$ be universal set

$$A = \{1, 3, 4, 6, 12\}, \quad B = \{3, 4, 5, 7, 8, 11\}$$

Find:-

- 1) A' 2) B' 3) $A \cup B$ 4) $A \cap B$ 5) $A' \cup B$
- 6) $A - B$ 7) $A \cup B'$

c) Find Adjacency matrix $(A(G))$ and incidence matrix $(I(G))$ of following graph.

