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BRAINWARE UNIVERSITY

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Term End Examination 2025-2026

Programme – BCA-Hons-2023/BCA-Hons-2024/BCA(MAWT)-Hons-2024/BCA-Hons-2025/BCA(MAWT)-Hons-2025

Course Name – Discrete Mathematical Structure

Course Code - BCA20001/BMT20001

(Semester II)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

(i) Select the correct option, $p \rightarrow q \equiv$

a) $\neg q \vee \neg p$

b) $\neg p \wedge q$

c) $\neg p \vee q$

d) $p \vee q$

(ii) If $p \leftrightarrow q \equiv (p \rightarrow q) \wedge r$ then r is, Select the correct one.

a) $p \rightarrow q$

b) $\neg p$

c) $q \rightarrow p$

d) $\neg q$

(iii)

Choose the correct option

If p and q are two propositions, then the conjunction of p and q is defined as,

a) $p \vee q$

b) $p \wedge q$

c) $\neg p \wedge \neg q$

d) none of these

(iv) Choose the correct option

If p and q are two propositions, then the disjunction of p and q is defined as,

a) $p \vee q$

b) $p \wedge q$

c) $\neg p \wedge \neg q$

d) none of these

(v) Choose the correct option

Let p and q be two propositions denoted as p : S Thomas is sincere and q : Thomas is intelligent be two propositions. Then $p \vee q$ describe as

- a) Thomas is sincere and he is intelligent b) Thomas is sincere or he is intelligent
- c) Thomas neither sincere nor intelligent d) none of these
- (vi) The smallest set A such that $A \cup \{1, 2\} = \{1, 2, 3, 5, 9\}$ is, choose the correct one
- a) $\{2, 3, 5\}$ b) $\{1, 2, 5, 9\}$
- c) $\{3, 5, 9\}$ d) None of these
- (vii) Domain of $R = \{(0, 2), (2, 4), (3, 4), (4, 5)\}$ is, Choose the correct option
- a) $\{0, 2, 4, 5\}$ b) $\{0, 2, 3, 4\}$
- c) $\{2, 4, 5\}$ d) $\{3, 4, 5\}$
- (viii) Range of $R = \{(0, 1), (2, 4), (3, 4), (4, 5)\}$ is, Select the correct option
- a) $\{0, 2, 4, 5\}$ b) $\{0, 2, 3, 4\}$
- c) $\{1, 4, 5\}$ d) $\{3, 4, 5\}$
- (ix) The binary relation $\{(1,1), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2)\}$ on the set $\{1, 2, 3\}$ is, Select the correct option
- a) reflexive, symmetric and transitive b) irreflexive, symmetric and transitive
- c) neither reflexive, nor irreflexive but transitive d) irreflexive and antisymmetric
- (x) If $f(x-2) = 2x^2 + 3x - 5$ then $f(-1) =$, Identify the correct option
- a) 0 b) 1
- c) -1 d) 2
- (xi) If the origin and terminus of a walk coincide then it is a, Choose the correct statement
- a) Path b) open walk
- c) circuit d) closed walk
- (xii) Choose the correct one, let p and q be two propositions if truth value of p is T and truth value of q is T then $p \wedge q$ be
- a) T b) F
- c) Both T and F d) None of these

(xiii) Choose the correct one, let p and q be two propositions if truth value of p is F and truth value of q is F then $p \wedge q$ be

- a) T
b) F
c) Both T and F
d) None of these

(xiv) If the mean of a, a+2, a+4, a+8 and a+11 is 10 then identify the value of a

- a) 1
b) 2
c) 5
d) 4

(xv) Select the median of the data 11, 12, 14, 17, 20, and 27, from the following options:

- a) $30/2$
b) $31/2$
c) $33/2$
d) $35/2$

Group-B

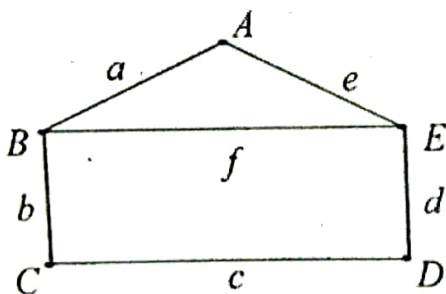
(Short Answer Type Questions)

3 x 5=15

2. If p is true and q is false then compute the truth value of $(p \wedge q) \rightarrow (p \vee q)$ (3)
3. If $f: R \rightarrow R$ $f(x) = x - 1$ and $g: R \rightarrow R$ $g(x) = 2x$ and construct that the two composite functions $f \circ g$ and $g \circ f$ will be different. (3)
4. Two fair coins thrown. Evaluate the probability of getting (i) at least one head (ii) three heads (iii) both heads or both tails. (3)
5. Show that the relation R on the set of integers, given by $R = \{(a, b): 2 \text{ divides } a - b\}$, is a transitive relation. (3)
6. Explain that a complete graph with n number of vertices consists of $\frac{n(n-1)}{2}$ number of edges. (3)

OR

(3)

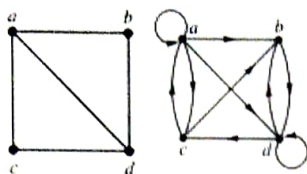


Calculate the degree of each vertices from the above Figure

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7. Show that $(p \vee q) \wedge (\sim p \wedge \sim q)$ is contradiction (5)
8. Show that the sum of the first n odd numbers is n^2 . (5)
9. Establish that the proposition $\{(p \wedge q) \rightarrow r\} \rightarrow \{p \rightarrow (q \vee r)\}$ Tautology (5)
10. Construct the adjacency matrix of the following graphs. (5)

 G H

11. Estimate the truth table $((p \rightarrow q) \vee (p \rightarrow r)) \wedge q$ (5)
12. The following frequency table is given below: (5)

Class	1-2	2-3	3-4	4-5	5-6	6-7
Frequency	17	14	2	10	15	10

Predict the mean of the frequency distribution.

OR

The following frequency table is given below:

Class	1-2	2-3	3-4	4-5	5-6	6-7
Frequency	17	14	2	10	15	10

Predict the median of the frequency distribution.
