BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – BCA-2019/BCA-2020/BCA-2021
Course Name – Discrete Structures
Course Code - GEBS201
(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) $p \wedge q = p$ and $p \vee q = p$,select the correct option

a) Contrapositive law
b) Absorption law
c) Idempotent law
d) D'Morgan's law

(ii) Inverse of the permutation $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$ is, Select correct one

a) $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$
b) $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \end{pmatrix}$
c) $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$
d) $\begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix}$

(iii) Let p: It is cold and q: It is raining, then the symbolic form of the statement 'It is not raining and it is not cold', Select the correct option

a) $\neg q \wedge p$
b) $\neg q \wedge \neg p$
c) $\neg(q \wedge p)$
d) None of these.

(iv) Identify the correct option If $f(x) = \frac{ax-b}{bx-a}$ then $f(x).f\left(\frac{1}{x}\right)$ is

a) 1
b) 2
c) 3
d) None of these

(v) Let a be an element in a group with order 5. Then the order of a^{-1}, Identify the correct option.

a) 1
b) 3
c) 5
d) Cannot be determined from the given data

(vi) If G is the forest with 41 vertices and 17 connected components, G has _____ total number of edges. Write the correct one

a) 3
b) 24
c) 31
d) 30

(vii) If G is the forest with 52 vertices and 10 connected components, G has _____ total number of edges. Write the correct one

a) 3
b) 42
c) 31
d) 30

(viii) The binary relation {(1,1), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2)} on the set {1, 2, 3} is, Choose the correct option

a) reflexive, symmetric and transitive
b) irreflexive, symmetric and transitive
c) neither reflexive, nor irreflexive but transitive
d) irreflexive and antisymmetric

(ix) What is the base case for the inequality $7^n > n^3$, where n = 3?, Choose the correct option

a) 652 > 189
b) 42 < 132
c) 343 > 27
d) None of these

(x) Identify the correct option, Given 10 people P_1, P_2, P_3,…..,P_{10}. How many line ups are there if P_2, P_4, P_8 want to stand together?

a) 8!
b) 6!
c) 7!
d) 10!

(xi) Select the correct one, If p be proposition 'He is intelligent' and q be a proposition 'He is tall'. Then $\neg q \wedge \neg p$

a) He is either intelligent or tall
b) He is neither tall nor intelligent
c) He is not intelligent
d) He is intelligent and tall

(xii) The domain of the function $f(x)=\log(x-1)$ is, Choose the correct option

a) $x>1$
b) $x\geq 1$
c) $x>0$
d) Any real x

(xiii) The number of elements in the group $(Z_3,+)$ is, Select the correct option

a) 1
b) 3
c) 4
d) 6

(xiv) Identify the correct option, Given 10 people P_1, P_2, P_3,…..,P_{10}. How many line ups are there if P_1, P_4, P_6 do not want to stand together?

a) 3386881
b) 3386880
c) 7!
d) 10!

(xv) Identify the number of even permutation of the symmetric group S_5 is

a) 25
b) 50

c) 60 d) 120

Group-B
(Short Answer Type Questions) 3 x 5=15

2. Examine that the algebraic structure $(Z, -)$ where – denotes the binary operation of subtraction on Z is neither associative nor commutative (3)

3. Describe Contradiction, With an example (3)

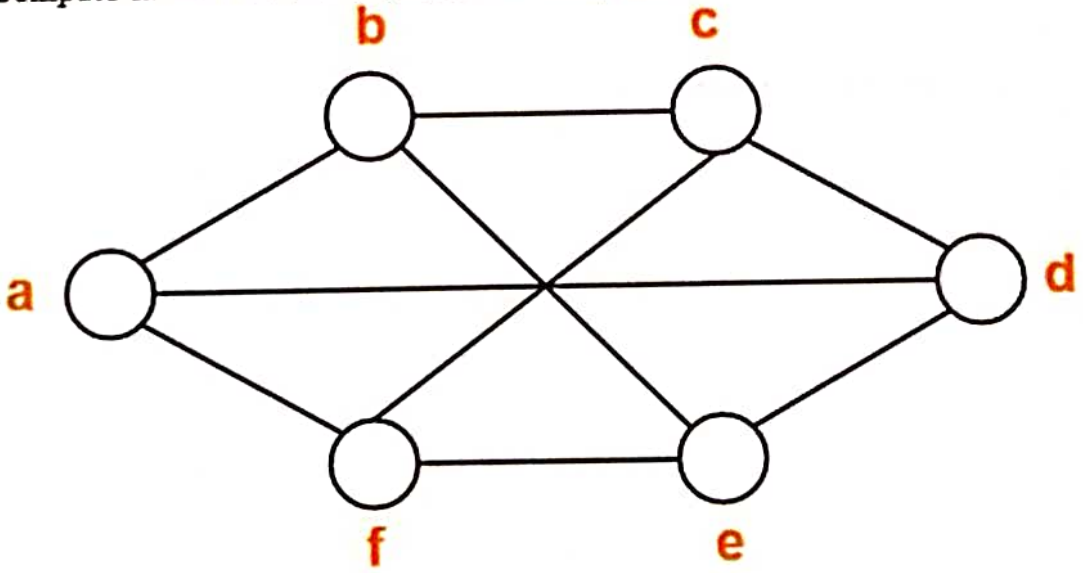
4. How many permutations can be interpreted from the letters ABCDEFG contain the string ABE? (3)

5. Let R is the relation on the set of strings of Hindi letters such that aRb iff $l(a) = l(b)$, where $l(x)$ is the length of the string x. Establish that R is an equivalence relation. (3)

6. Illustrate that the sum of the degree of all vertices in a graph is twice the number of edges in the graph (3)

OR

Compute chromatic number of the following graph (3)



Group-C
(Long Answer Type Questions) 5 x 6=30

7. Let p: He is intelligent and q: He is tall be two propositions. State the following statements in symbolic from using p and q: (5)

(i) He is tall but not intelligent.

(ii) He is neither tall nor intelligent.

(iii) He is intelligent or he is tall.

(iv) It is not true that he is intelligent or tall.

(v) It is not true that he is not tall or not intelligent.

8. What is Tautology and deduce that $\sim(p \vee q)$ is not a tautology (5)

9. Show that if $A \rightarrow B$ is one-one onto, then $f^{-1}: B \rightarrow A$ is also one-one onto. (5)

10. There are 12 bulbs in a room each of which is operated independently by 12 different switches. Examine how many ways the room can be illuminated? (5)

11. Express ${}^{n}C_{r}+{}^{n}C_{r+1}={}^{n+1}C_{r+1}$ (5)

12. Explain that an undirected graph has an even number if vertices of odd degree. (5)

OR

Deduce directed graph and indirected graph and explain with examples. (5)

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