



Seat	
No.	

Total No of Pages : 4

Kamala College, Kolhapur
(Autonomous)
B.C.A. (Part-I) (Semester-II)
Examination March/April, 2024.
Mathematical Foundations for Computer Applications
Subject Code: AEC 312

Day and Date: Friday, 12/04/2024

Total Marks: 80

Time: 12:00 pm to 03:00 pm

Instructions:

1. Que 1 and Que 8 are Compulsory
2. Attempt Any Three Questions From Que 2 to Que 7.
3. Figures to the right indicate full marks.

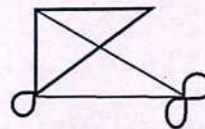
Que.1) Select the correct alternative and rewrite the statement (12)

1) The dual of $[\sim p \vee q] \wedge t$ is,

- a) $[p \wedge \sim q] \vee t$ b) $[\sim p \wedge q] \vee c$
c) $[p \wedge \sim q] \vee c$ d) $[\sim p \wedge q] \vee t$

2) The number of edges in the adjoining graph are

- a) 11 b) 7 c) 8 d) 10



3) If $A = \{2n/n \in N\}$ and $B = \{2^n/n \in N\}$ then

- a) $A \subset B$ b) $B \subset A$ c) $A = B$ d) $n(A) = n(B)$

4) If $A = \begin{bmatrix} 2 & 3 & 6 \\ 1 & -2 & 5 \end{bmatrix}$ then $A^T =$

- a) $\begin{bmatrix} 1 & -2 & 5 \\ 2 & 3 & 6 \end{bmatrix}$ b) $\begin{bmatrix} 3 & 6 & 2 \\ -2 & 5 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 1 \\ 3 & -2 \\ 6 & 5 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 2 \\ -2 & 3 \\ 5 & 6 \end{bmatrix}$



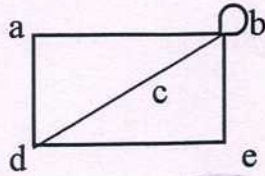
- 5) Which of the following statement is true
- a) $3+7=4$ or $3-7=4$
 - b) if Pune is in Maharashtra, then Hyderabad is in Kerala
 - c) It is false that, 12 is not divisible by 3
 - d) The square of any odd integer is even
- 6) The number of vertices in $K_{m,n}$ is.....
- a) $m+n$ b) $m^2 + n^2$ c) mn d) $m-n$
- 7) The power set of the set of the set $\{1,2\}$ is....
- a) $\{\{1\},\{2\}\}$ b) $\{\emptyset, \{1\}, \{2\}, \{1,2\}\}$
 - c) $\{\{1\},\{2\},\{1,2\}\}$ d) $\{\emptyset, \{1\}, \{2\}, \{1,2\}\}$
- 8) If $A = \{x/x \text{ is a natural number } \leq 30 \text{ and is divisible by 7 or 11}\}$
Then $n(A)$ is equal to.....
- a) 4 b) 8 c) 6 d) 2
- 9) The Converse of " If hard work, then Pass" is,
- a) If pass, then hard work,
 - b) If not pass, then not hard work
 - c) If not hard work, then not pass
 - d) If not hard work then pass
- 10) Number of edges in K_4 is...
- a) 10 b) 6 c) 15 d) 24
- 11) The difference of $A-B$ is equal to...
- a) $A \cap B$ b) $A' \cap B$ c) $A \cap B'$ d) $A' \cap B'$
- 12) If $A = \begin{bmatrix} 1 & 3 \\ 5 & 6 \end{bmatrix}$ then $2R_1$ gives new matrix as,
- a) $\begin{bmatrix} 2 & 3 \\ 10 & 6 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 6 \\ 5 & 6 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 6 \\ 10 & 12 \end{bmatrix}$ d) $\begin{bmatrix} 2 & 6 \\ 10 & 12 \end{bmatrix}$



Que. 2) a) Define degree of a vertex with example, and explain even vertex, odd vertex, Isolated vertex, pendant vertex

b) Explain walk and cycle with example. And in the given graph, state whether the given walk is cycle, path, trail, walk

- i) bb ii) edcb iii) abcde iv) abeda (8)



Que. 3) a) Define a statement with example. And Write Converse, Inverse and Contrapositive of, "If a function is differentiable then it is continuous." (8)

b) Check whether the following statement pattern are tautology, contradiction or contingency.

- i) $[(p \rightarrow q) \wedge q] \rightarrow p$
 ii) $(p \wedge \sim q) \leftrightarrow (p \rightarrow q)$ (8)

Que.4) a) Explain Cartesian product of two sets, And solve,

if $A = \{a, b, c\}$, $B = \{x, y\}$, $C = \{1, 2, 3\}$ then find

- i) $A \times B$ ii) $C \times B$ iii) $A \times A$ (8)

b) Explain Union and difference of two sets with venn diagram (8)

Que. 5) a) Define Identity matrix. (8)

And If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, prove that $A^2 - 5A + 7I = 0$, where I is 2 x 2 unit matrix

b) Define transpose of a matrix

And hence, If $A = \begin{bmatrix} 2 & -1 \\ 3 & -2 \\ 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 3 & -4 \\ 2 & -1 & 1 \end{bmatrix}$

Then verify that, $(AB)^T = B^T A^T$ (8)

Que 6) a) State any four laws of logic and prove the following logical

$$\text{Equivalence } (p \leftrightarrow q) \equiv (p \wedge q) \vee (\sim p \wedge \sim q) \quad (8)$$

b) Define 'matrix' (8)

And find x, y, z if

$$\left[5 \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 1 & 1 \end{bmatrix} - 3 \begin{bmatrix} 2 & 1 \\ 3 & -2 \\ 1 & 3 \end{bmatrix} \right] \begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} x - 1 \\ y + 1 \\ 2z \end{bmatrix}$$

Que. 7) a) Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

And $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8, 10\}$

And $C = \{1, 2, 3, 4, 5\}$ what bit string represent,

i) $A \cup B$ ii) C^1 iii) $A - B$ iv) $A \oplus B$ (8)

b) What is complete graph and Bipartite graph. Explain with examples (8)

Que 8) Write short note on any FOUR of the following (20)

- i) Methods of a set [Roster and rule method]
- ii) Union and Intersection of graph.
- iii) Conjunction and disjunction of statements
- iv) Determinant of a matrix and singular matrix.
- v) Adjacency and Incidence matrix.
- vi) Simpls graph, multigraph and pseudograph.

