



A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE
(AUTONOMOUS) (Grant-in-Aid)
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BCA (Semester - 3) External Examination - 2025
USO3AEBCA06: Discrete Mathematics

Date: 10-10-2025, (FRIDAY)

Time: 02:00 PM to 03:30 PM (1.5 HRS.)

Total marks: 25

NOTE: The symbols used in this paper have usual meaning unless specified.

Q-1 Write the most appropriate answer from the following multiple-choice questions. [05]

- (1) If $\vec{a} = (2, -3, 6)$, $\vec{b} = (8, 2, -3)$ then find $\vec{a} \cdot \vec{b} =$ _____
(a) -8 (b) 9
(c) 10 (d) 8
- (2) If $A = A^T$, then A is called _____
(a) Skew- Symmetric Matrix (b) Symmetric Matrix
(c) Orthogonal Matrix (d) None
- (3) Degree of pendent vertex is _____.
(a) 1 (b) 0
(c) 2 (d) 3
- (4) A graph in which all vertices have the same degree is called _____.
(a) Skew- Symmetric Matrix (b) Symmetric Matrix
(c) Orthogonal Matrix (d) None
- (5) An alternating sequence of vertices and edges in graph is called _____.
(a) trail (b) cycle
(c) path (d) degree



Q-2 [A] If $A = \begin{bmatrix} 2 & -1 \\ 1 & 0 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 3 & -1 \\ 2 & -5 & 6 \end{bmatrix}$ then check that $(AB)^T = B^T A^T$ or not. [05]

[B] If $u = (4, 3, 0, 1)$, $v = (-2, 0, 3, 1)$ & $w = (0, 4, -7, 1)$ then find [05]

(1) Is $(u + v)w = uw + vw$?, (2) $\|w\|$, (3) $\|3u + 4v\|$ (4) $2u \cdot 3v$

OR

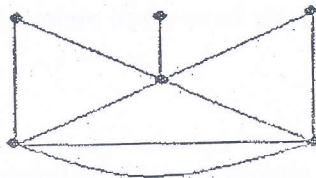
Q-2 [A] If $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 2 & 5 \\ 3 & 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 6 & 0 \\ 0 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ then find $A+B$, $A-2B$, $(2A-B+3I)^T$ [05]

[B] For the matrix given below obtain $\det(A)$, $\det(B)$ and $\det(A+B)$. [05]

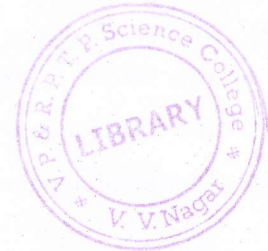
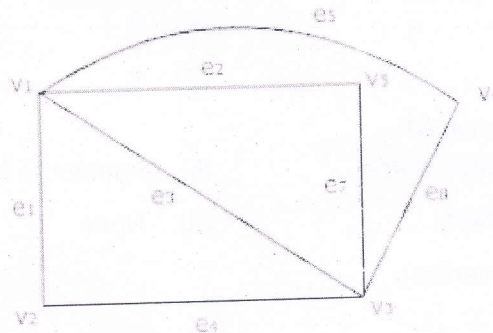
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 6 & 0 \\ 0 & -1 & -1 \end{bmatrix}, B = \begin{bmatrix} 2 & 5 & 1 \\ 1 & 1 & -1 \\ 4 & 0 & 3 \end{bmatrix}$$

Q-3 State Euler's formula for planar graph. Verify Euler's formula for the following [05]

[A] graph



[B] Write the adjacency matrix and the incident matrix of given below graph [05]



OR

Q-3 [A] Draw the multigraph whose adjacency matrix is $A = \begin{bmatrix} 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 2 \\ 1 & 1 & 0 & 2 & 0 \end{bmatrix}$ and [05]

$$B = \begin{bmatrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$$

[B] Define Complete graph with examples. Also Find the number m of edges in the graphs: (1) K_{120} (2) K_{200} (3) K_{15} (4) K_{24} [05]