

**MASTER IN COMPUTER
APPLICATIONS (MCA) (REVISED)**

Term-End Examination

December, 2024

**MCS-033 : ADVANCED DISCRETE
MATHEMATICS**

Time : 2 Hours

Maximum Marks : 50

Note : *Question No. 1 is compulsory. Answer any
three questions from the rest.*

1. (a) Show that $K_{m,n}$ is not Hamiltonian when
 $m + n$ is odd. 4
- (b) Explain the term 'Planar Graphs'. Is a
subgraph of a planar graph, planar ? Why ?
4
- (c) Answer the following; with suitable
justification : 4
 - (i) Is a Eulerian graph, Hamiltonian ?
 - (ii) Is an Hamiltonian graph, Eulerian ?

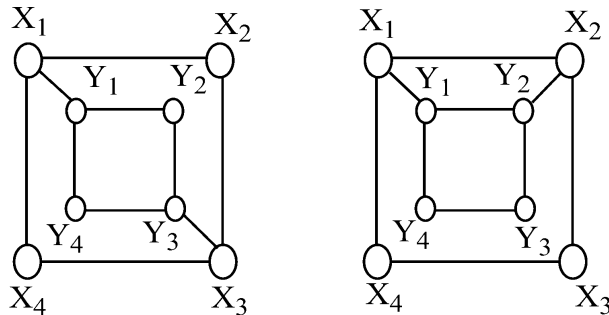
- (d) Solve the recurrence relation : 4

$$F_n = 5F_{n-1} - 6F_{n-2},$$

where $F_0 = 1$ and $F_1 = 4$.

- (e) Use power series method to determine the number of integer solutions to the linear equation $X_1 + X_2 = 3$ with $0 \leq X_1 \leq 1$ and $0 \leq X_2 \leq 2$. 4

2. (a) Write Handshaking theorem and use it to verify the statement “Any graph can only have an even number of odd vertices.” 5
- (b) Briefly discuss the travelling salesman problem with suitable example. 5
3. (a) Explain the term ‘isomorphism’. Are the following graph isomorphic ? 5



(b) Find cheomatic no. of the following : 5

(i) a tree with at least two vertices

(ii) an even cycle C_{2n} , $n \geq 2$

4. (a) Solve the recurrence relation : 5

$$a_n = n^3 a_{n-1}, \quad n \geq 1, \quad a_0 = 2$$

(b) Solve the recurrence relation $T_n = 2T_{n-1} + 1$,

if $n \geq 2$ and $T_1 = 1$, using generating functions technique. 5

5. Write short notes on the following, with suitable example for each : $5 \times 2 = 10$

(i) Walk

(ii) Path

(iii) Circuit

(iv) Cycles

(v) Edge Connectivity

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