No. of Printed Pages : 4

MCS-033

MCA (Revised)

Term-End Examination

01035

June, 2018

MCS-033 : ADVANCED DISCRETE MATHEMATICS

Time : 2 hours *Maximum Marks : 50*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Write the recurrence relation of Tower of Hanoi problem and explain the formulation. *4*

(b) A person invested ₹ 10,000 @ 12% interest compounded annually. How much will he get at the end of 15 years ? (Solve using recurrence relation only) *4*

(c) Explain generating function. What type of problems can be solved using generating function for recurrence relation ? *4*

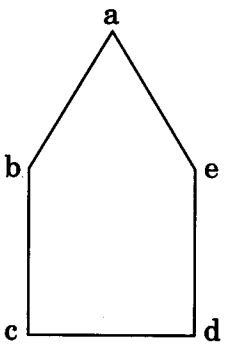
(d) Is there a simple graph corresponding to the following degree sequence : 4

(i) (1, 1, 2, 3)

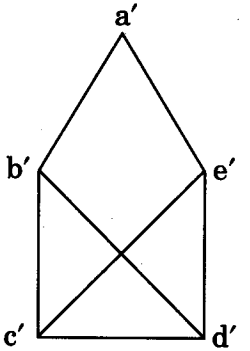
(ii) (2, 2, 4, 6)

(e) For what value of n is the graph of K_n Eulerian ? 4

2. (a) Find whether the following pair of graphs are isomorphic or not. 5

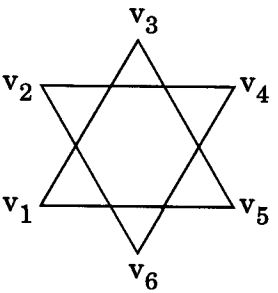


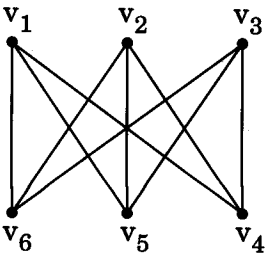
(G)



(G′)

(b) The following graph contains no Euler circuit. Give reasons. 5

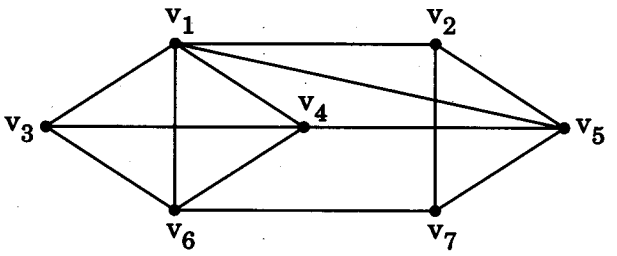




3. (a) If G is a connected simple graph with $(h \geq 3)$ vertices and e edges then 5

$$e \leq 3n - 6$$

(b) Consider the graph G. Use suitable graph colouring algorithm to colour G and find $\chi(G)$. 5



4. (a) Solve

$$a_{n+2} - 5a_{n+1} + 6a_n = 2$$

with initial condition $a_0 = 1$, $a_1 = -1$. 5

(b) Determine the generating function of the following sequence : 5

$$a_r = \begin{cases} 2^r & \text{if } r \text{ is even} \\ -2^r & \text{if } r \text{ is odd} \end{cases}$$

5. (a) Determine the number of integer solutions to linear equation 5

$x_1 + x_2 = 3$ with $0 \leq x_1 \leq 1$ and $0 \leq x_2 \leq 2$.

(b) Show that $a_n = -2^{n+1}$ is the solution of the non-homogeneous linear recurrence relation 5

$$a_n = 3a_{n-1} + 2^n$$