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MCA (Revised)
Term-End Examination
December, 2012
MCS-033 : ADVANCED DISCRETE
MATHEMATICS

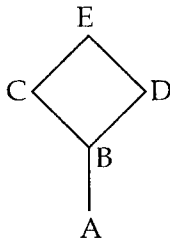
Time : 2 hours

Maximum Marks : 50

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

1. (a) Find the order and degree of the following recurrence relation. Also state are they homogeneous or non homogeneous ? 6
- (i) $a_n = 3 a_{n-1} + n^2$
- (ii) $a_n = a_{n-1} + a_{n-2}$
- (b) Construct a 5-regular graph on 10 vertices. 3
- (c) Show that C_6 is bipartite and K_3 is not bipartite. 3
- (d) What is a spanning tree ? Illustrate with an example and a non-exemplar each. 2
- (e) Solve the recurrence $a_n = a_{n-1} + 2 ; a_0 = 3$ 3
- (f) Find the sequence generated by the following : 3
- $5x^2 (1-x)^{-1}$

2. (a) Solve $a_r = a_{r-1} + r^2$; $a_0 = 7$ by substitution method. 5
- (b) State and Prove Euler's formula for graph. 5
3. (a) Solve the recurrence relation described as follows : 5
- $a_n = 5 a_{n-1} - 6 a_{n-2}$, for $n \geq 2$, $a_0 = 1$, $a_1 = 0$
- (b) Solve : $a_r - 7a_{r-1} + 10a_{r-2} = 0$, $r \geq 2$ 5
4. (a) Use Substitution method to solve the following : 4
- $t_n = 1$, $n = 2$ and $t_n = 2 t_{n-1} + 1$, $n > 2$
- (b) Use generating function to solve 4
- $a_n = 3 a_{n-1} + 2$, $n \geq 1$ with $a_0 = 1$
- (c) Illustrate Cutpoint using an example. 2
5. (a) Determine whether, the following graph has an Euler path or Eulerian Circuit ? 3



- (b) Determine the chromatic number of the complete graph K_n with n vertices. 4
- (c) Show that K_5 is non-planar. 3