B. TECH. SEM - III (INF. TECH.) (2014 COURSE) (CBCS) :
SUMMER - 2018
SUBJECT: DISCRETE MATHEMATICS

Day: **Tuesday** Time: **02.30 PM TO 05.30 PM**
Date: **22/05/2018** **S-2018-2250** Max Marks: 60

N.B:

1) All questions are **COMPLUSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw figures **WHEREVER** necessary.
4) Assume suitable data if necessary.

Q.1 How many integers between 1 to 2000 are divisible by 2, 3, 5 or 7? **(10)**

OR

Q.1 How many integers between 1 to 1500 are divisible by 3, 5, 7 or 11? **(10)**

Q.2 Define with example: **(10)**
i) Reflexive relation
ii) Irreflexive relation
iii) Symmetric relation
iv) Asymmetric relation
v) Antisymmetric relation

OR

Q.2 Describe the process of finding transitive closure using warshall's algorithm with example. **(10)**

Q.3 **a)** Show that any integer composed of 3^n identical digits is divisible by 3^n? **(06)**
b) Solve recurrence relation: **(04)**
$a_n = 2a_{n-1} + 3a_{n-2} + 5^n$, $n \geq 2$ with $a_0 = -2$, $a_1 = 1$

OR

Q.3 **a)** $a_n + 6a_{n-1} + 12a_{n-2} + 8a_{n-3} = 2^n$, $n \geq 3$ with $a_0 = 0$, $a_1 = 0$, $a_2 = 2$ **(06)**
b) Show that for any integer n **(04)**
$(11)^{n+2} + (12)^{2n+1}$ is divisible by 133.

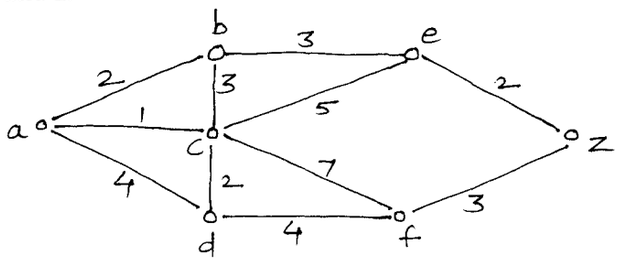
Q.4 6 boys and 6 girls are to be seated in a row such that- **(10)**
i) All boys sit together and girls sit together.
ii) No two girls sit together.
iii) Boys and girls sit alternately.
iv) The extreme positions are occupied by boys.
Find number of ways in each case.

OR

Q.4 Find: **(10)**
i) The number m_1 of permutations that can be formed from all the letters of MISSISSIPPI.
ii) Find the number m_2 for the above case if words are to begin with an I.
iii) Find the number m_3 for the word in (i) if the two P's are to be next to each other.
iv) Find number m_4 for the word in (i) if the four S's are to be next to each other.

P.T.O.

Q.5 Apply Dijkstra's shortest path algorithm to find the shortest path between vertices a and z. **(10)**



OR

Q.5 Explain with example: **(10)**
i) Adjacency matrix
ii) Handshaking lemma
iii) Pigeonhole principle
iv) Eulerian circuit
v) Hamiltonian path

Q.6 Define with example: **(10)**
i) Centre of tree
ii) Eccentricity of vertex
iii) Cut points
iv) Roted tree
v) Level of tree

OR

Q.6 Define with example: **(10)**
i) Height of tree
ii) Optimal tree
iii) Spanning tree
iv) Binary tree
v) Fundamental cut set

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