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**B.Tech. MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

June, 2014

BIMEE-010 : MECHANICAL SYSTEM DESIGN

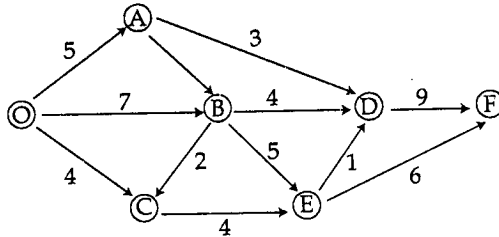
Time : 3 hours

Maximum Marks : 70

Note : Answer any five questions. All questions carry equal marks.

1. (a) What is importance of understanding the problem environment ? Discuss the hierarchical nature of engineering problems. Explain the "need statement". 7
- (b) Explain four essential attributes in defining a system and give four essential definitions of systems. 7
2. (a) What is the significance of black box approach in system analysis ? Explain the general methodology for carrying out system analysis. 7
- (b) Explain with the help of suitable examples the difference between an Iconic Model and an Analog Model. 7
3. (a) Explain the following : 7
 - (i) Combinational Optimization
 - (ii) Subjective Optimization Method

- (b) For the network flow diagram shown below, determine the maximum flow using a suitable algorithm. 7



4. Write short notes on any four of the following : 14
- Planning Horizon
 - Time value of money
 - Feasibility assessment
 - Expected monetary value
 - Probability density function
 - Utility value
5. (a) What is the importance of probability in Decision Analysis? Explain Baye's theorem and its application. 7
- (b) What are the limitations of simulation approach? How can computers be used for the purpose of simulating a system? 7
6. A firm intends to invest in a piece of equipment and narrowed down its choice of equipment to A_1 , A_2 or A_3 . Three future states are being considered by the firm : 14
- S_1 : Economic progress
 S_2 : Economic stability
 S_3 : Economic recession

Analysis leads to the following rates of return for the investment

	S_1	S_2	S_3
A_1	20	1	-6
A_2	9	8	0
A_3	4	4	4

what course of action do the following decision criteria indicate : maxi-min, maxi-maxi and mini-max regret ?

7. For a certain inventory item, the demand rate distribution and Lead-Time (LT) distribution data is given in tables x and y respectively. If the initial stock = 0, compute the average number of units/short/surplus by Monte-Carlo simulation. Use the following set of random numbers : for demand simulation :

68, 42, 47, 39, 10, 99, 83, 95, 65 and 51

for LT simulation :

12, 76, 39, 40, 31, 21, 75, 50, 88 and 58

Table x

demand/ day	Probability
1	0.25
2	0.30
3	0.20
4	0.15
5	0.10

Table y

Lead time (days)	Probability
2	0.20
3	0.40
5	0.30
6	0.10