BIMEE-010

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

00465   **Term-End Examination**

December, 2014

BIMEE-010 : MECHANICAL SYSTEM DESIGN

Time : 3 hours   *Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume missing data, if any.*

1. (a) Enumerate the factors responsible for the development and deployment of concurrent engineering in manufacturing industries. Describe each of them.   7

    (b) What are the different types of engineering systems ? Describe the overall design process with the help of a block diagram.   7

2. (a) List and explain the major models used in system analysis/design.   7

    (b) Describe State theory approach and discuss its essential features.   7

3. (a) Explain the following :   7
        (i)   Model with inequality constraints
        (ii) Time value of money

    (b) Discuss the role of feasibility assessment in evaluating a system.   7

4. (a) What are the objectives of an optimization process ? Explain with the help of a suitable example. 7

(b) Explain Network flow problem with the help of an example. 7

5. A company is working on a present model, which, after paying for materials, labour, etc. brings a profit of ₹ 20,000. The company has the following alternatives : 14

(i) The company can conduct research R_1, which is expected to cost ₹ 12,000 and having 90% probability of success. If successful, the gross income will be ₹ 30,000.

(ii) The company can conduct research R_2, expected to cost ₹ 8,000 and having a probability of 60% success. If successful, the gross income will be ₹ 28,000.

(iii) The company can pay ₹ 10,000 as royalty of new process which will bring a gross income of ₹ 24,000.

(iv) The company may continue the existing process. Because of limited resources, only one of the two types of research can be carried out at a time.

Draw the decision tree and find the optimal strategy for the company.

6. (a) Briefly explain what is meant by iconic, analog, mathematical and simulation models. What are the advantages of using models in engineering design and analysis ? Explain. 7

(b) Describe the procedure for formulating a mathematical model for a compound bar system. 7

7. Write short notes on any *four* of the following :

$$4 \times 3\frac{1}{2} = 14$$

(a) Planning Horizon

(b) Analytical methods of optimization

(c) Graph modelling and analysis process

(d) Need of modelling

(e) Advantages of system approach