

BTECH
(SEM VII) THEORY EXAMINATION 2018-19
Mechanical System Design

Time: 3 Hours

Total Marks:100

Notes: Assume any Missing Data.

SECTION-A

Q.1 Attempt all the parts.

(10x2 =20)

- a) What do you understand by design morphology?
- b) Write down the difference between black box approach and white box approach.
- c) Briefly explain Subjective method of optimization.
- d) Explain term “planning horizon”.
- e) Distinguish between model and modeling.
- f) What are the characteristics of a system?
- g) Explain engineering activities matrix.
- h) Write a brief note on Iconic, analogue and mathematical models.
- i) Named different types of models used commonly for mechanical systems design.
- j) What are the basic steps of a decision making process?

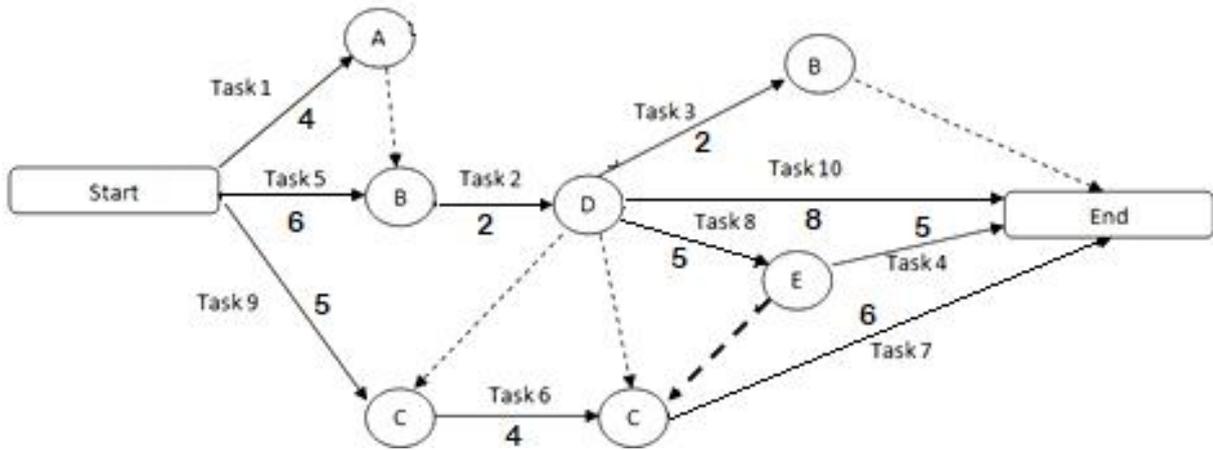
SECTION-B

Q.2. Attempt any 5 parts. (Questions no. 2f, 2g and 2h are compulsory) (5x10 = 50)

- a) Give the basic aspects of concurrent engineering. How it helps in product design & development? Illustrate with suitable example?
- b) What is Monto Carlo method of simulation? Explain its purpose, advantages and limitations.
- c) Define need statement in detail and write down at least two need statements of the following:
 - (i) Hand kerchief
 - (ii) Oil pipe line
 - (iii) Envelop
- d) Explain clearly the various ingredients of decision problem. What are the basic steps of a decision making process?
- e) Explain four essential attributes in defining a system and give four essential definitions of systems. Illustrate the system attributes with reference to a manufacturing system.
- f) What are the characteristics of material handling system? Briefly explain the material handling system.
- g) Find the absolute maximum and minimum value of the function

$$f(x) = x^3 - 3x^2 + 1 \text{ for } -\frac{1}{2} \leq x \leq 4$$

- h) Find out the slack and critical path in a given network:



SECTION-C

Q.3. Attempt any 2 parts. (Question No. 3c is Compulsory)

(2x15 = 30)

- a) Total 40 students were given a test. The table below shows the cumulative frequency of the results obtained.

Mark	10	20	30	40	50	60	70	80	90	100
Number of students scoring the mark or less	2	5	8	11	18	24	30	32	37	40

- (i) State the probability that a student chosen at random will have a mark less than or equal to 60.
 - (ii) Two students are chosen at random from the 40 students. Find the probability that neither have marks more than 60.
 - (iii) A second group of students was tested and one-fifth of them scored more than 70 marks. If a student is now chosen at random from each group, find the probability that at least one student would have scored more than 70
- b) Explain the following:
- (i) Probability density function
 - (ii) Utility value
 - (iii) EMV
 - (iv) Baye's theorem
- c) Write the answer of the following:
- (i) At a telephone booth, customers arrive with an average time of 1.2 time units between one arrival and the next. Service time is assumed 2.8 time units. Simulate the system for 12 time units by assuming the system starts at $t = 0$. What is the average waiting time per customer?
 - (ii) What is simulation? Role of computer in simulation. In addition, what are the limitations and advantages of simulation approach