Roll No. | | | | | | | | | | |

B.E (F.T) END SEMESTER EXAMINATIONS April/May 2019

INDUSTRIAL ENGINEERING

Semester VI

IE8010 – MODELING OF MANUFACTURING SYSTEM

(Regulation 2012)

Time: 3 Hours | Max. Marks 100

Answer ALL Questions

PART-A (10 x 2 = 20 Marks)

1. Compare the advantages of process and product layout.
2. State the elements of manufacturing lead time.
3. What are the advantages of group technology?
4. State the assumptions of modeling of paced line without buffers
5. What is ergodic state?
6. What do you mean by sojourn time?
7. State some priority rules used in queuing networks.
8. Compare open and closed queuing networks with an examples
9. What are the seven wastes in lean manufacturing?
10. Compare pull and push production methods.

Part – B (5 x 16 = 80 marks)

11. a In a certain batch production system, a part goes through an average of six operations. Each operation takes 6 min on the average. Average batch size is 5 and 24 such batches are processed during a week. Average setup on each machine for each batch is 3h and inspection, moving and waiting after each operation per batch is 10h. There are 18 production machines in the plant. The plant operates 80 production hours a week. Assume that rejection rate is zero. (10)

Determine

i) Average production time/unit of product/machine

ii) Production rate/machine

iii) MLT

iv) Production capacity

v) Machine utilization.

b) Explain four configurations of manufacturing system based on number of products and volume. (6)

12. a) Consider the n=8 parts and m=6 machines problems of table below. Order the part machine matrix to form the cells using.

i. Rank Order Clustering (8)

ii. Similarity Coefficient method (8)

M/C	Part							
	1	2	3	4	5	6	7	8
A	1	1			1			
B				1				1
C		1	1			1	1	
D				1				1
E			1	1		1	1	
F	1	1			1			

(OR)

12 b) i) Write down all the possible initial states, associated probabilities and the resultant states of two stage paced lines with buffer. (8)

(ii) Explain all the rules of system reduction principle in detail. (8)

13. a) A machine component is replaced as rule once in 5 week. However it has been found to wear out in less than 5 weeks in some cases. It is found that 10% of the components were replaced at the end of the first week, 15% of the week old components were replaced a the end of the second week, 35% of the 2 week old components were replaced at the end of the third week, and 40% of the 3 week old components were replaced at the end of the fourth week. Set up the transition probability matrix of a DTMC formulation of the above situation. Obtain the age distribution of a component after the system has been in operation for a long time. A component is I week old, i= 0,1,2,3,4. What is the expected length of time until its replacement? Can you recommend any replacement policy based on these results?

(OR)

b) Explain the following PETRI NETS constructs with neat sketch

i. Sequential Execution

ii. Conflict

iii. Concurrency

iv. Synchronization

v. Confusion

vi. Priorities

14. a) There are two systems that follow M/M/1 queue. The first system has an NC

machine with production rate of 10 parts/h and the second has an NC machine with rate of 20 parts/h. the maintenance cost of the first system is 100 units per month and the second system is 180 units per month. The arrival rate of the part is 8/h. the inventory cost of parts is 1 unit per hour. Assume 200 working hours per month find the cost effective system. Also find the mean number of parts in the system and in queue for both machines.

(OR)

b) Write short notes on
   i. Tandem Queuing network with an example (8)
   ii) Open queuing network (8)

15. a) Explain various elements of lean production in detail.

(OR)

b) Explain the JIT principles.