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18ME72

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Computer Aided Design and Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Automation. Explain different types of automation. (10 Marks)
 b. The average part produced in a certain batch manufacturing plant must be processed through an average 6 machines. 20 new batches are launched each week. Average operation time is 6 mins average set-up time is 5 hrs, average batch size is 25 parts, average non-operation time per batch is 10 hrs/machine. There are 18 machines in the plant. The plant operates an average of 70 production hours per week. Scrap rate is negligible, determine:
 (i) Manufacturing Load Time (MLT) for an average part (ii) Production rate
 (iii) Plant capacity (iv) Plant utilization (v) WIP (10 Marks)

OR

- 2 a. What is buffer storage? Explain types of buffer storage with neat sketch. (08 Marks)
 b. Define Upper bound approach and lower bound approach. (04 Marks)
 c. For a 10 station transfer line, refer following data:
 $P = 0.01$ (all stations have an equal probability of failure)
 $T_c = 0.5$ min, $T_d = 5.0$ min
 Using upper bound approach, determine: (i) The frequency of line stop
 (ii) The average production rate (iii) The line efficiency (08 Marks)

Module-2

- 3 a. Explain with block diagram, the design process using Computer Aided Design (CAD). (10 Marks)
 b. Explain the different functions of graphics packages. (10 Marks)

OR

- 4 a. Explain in detail the Retrieval type of CAPP. (10 Marks)
 b. What is MRP? Explain the different inputs of MRP with block diagram. (10 Marks)

Module-3

- 5 a. Briefly explain different types of manufacturing cells. (10 Marks)
 b. What is AS/RS? Explain different types of AS/RS. (10 Marks)

OR

- 6 a. By using the given information:
 The product demand is 1800 units/week; The industry works 48 hrs/week ;
 Number of operators 8 ; Uptime of assembly is 94% ; There is no repositioning required
 Determine: (i) Line efficiency (ii) Balance delay (iii) Smoothness index, by using largest candidate rule method. The work elements and their times involved in the assembly operation is as below:

Element	1	2	3	4	5	6	7	8
Tek (min)	1.0	0.5	0.8	0.3	1.2	0.2	0.5	1.5
Predecessor by	-	-	1, 2	2	3	3, 4	4	5, 6, 7

(14 Marks)

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b. Define and write the mathematical model of:

- (i) Total work content time (T_{wc})
- (ii) Cycle Time (T_c)
- (iii) Smoothness Index (SI)

(06 Marks)

Module-4

- 7 a. Explain briefly the steps involved in the development of a part program. (10 Marks)
- b. List out the advantages, limitations and applications of CNC's. (10 Marks)

OR

- 8 a. Explain with neat sketches the different joints used in industrial robots. (10 Marks)
- b. Write a short note on robot programming methods. (10 Marks)

Module-5

- 9 a. Define additive manufacturing systems and list out its advantages, disadvantages and application. (10 Marks)
- b. With neat sketch, explain sheet lamination type AM process. (10 Marks)

OR

10 Write short notes on:

- a. Evolution of industry 4.0
- b. Big data and cloud computing for IoT
- c. Supply chain optimization
- d. Cyber physical manufacturing systems

(20 Marks)

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