Ex/PG/ProdE/T/129B/2018

MASTER OF PRODUCTION ENGINEERING EXAMINATION, 2018

(2nd Semester)

ADVANCED MANUFACTURING PLANNING AND CONTROL

Time: **Three hours** Full marks: **100**

1. What is master production schedule? State the role of master production scheduling. Elaborate the twelve principles of master scheduling. (4+4+12)

2. a) Highlight and describe different stages in manufacturing planning and control. (6)

   b) What are the different types of inventory policies adopted in a supply chain? (4)

   c) A cast iron bracket has a demand of 15000 units per year. The cost per order is Rs. 300 and the holding cost per unit is Rs. 4 per year. The replenishment is instantaneous and no shortage is allowed. Determine (i) the economic order quantity, (ii) the number of orders per year, (iii) the time between orders and (iv) total cost. (10)

3. a) Define the following sequencing rules with appropriate examples: (8)
   i) First-Come-First-Serve (FCFS),
   ii) Shortest Processing Time (SPT),
   iii) Earliest Due Date (EDD)
   iv) Critical Ratio (CR)

   b) A machine center in a job shop for a local fabrication company has five unprocessed jobs remaining at a particular point of time. The jobs are labeled 1, 2, 3, 4 and 5 in the order that they entered the shop. The respective processing times and due dates are given in the following table:

Job number	Processing time	Due date
1	25	15
2	17	18
3	12	20
4	4	16
5	14	13

   Now compute and compare the mean flow time, average tardiness and number of tardy jobs using (i) FCFS, (ii) SPT, (iii) EDD and (iv) CR. (12)

4. A particular organization want to manufacture 75 picture frames per week with the following product structure (indented bill of material):

   A Picture frame
   B Subassembly 1 (3 required)
   C Subassembly 2 (1 required)
   D Fastener

   The required data are provided in the following table:

	On hand	LT	SS	Q
A	20	1	0	25
B	30	2	0	50
C	50	1	15	50
D	60	1	22	25

   Construct the MRP record for week 1-5. (20)

5. Three jobs, A,B and C are waiting to be started on machine centers X and then be completed on machine center Y. The following information pertains to the jobs and work centers. (20)

Job	Hours allowed for machine center X	Hours allowed for machine center Y	Day when due
A	22	16	10
B	125	22	15
C	90	20	20

Machine center X has 60 hours of capacity per week (5 days) and machine center Y has 40 hours of weekly capacity. Two days are allowed to move jobs between machine centers. Scheduling these jobs by earliest due date, can they be completed on time? (12M)

6. Write short notes on the following (any four): (5x4)

   (a) Make-to-stock and make-to-order production strategies,

   (b) NEH heuristic,

   (c) BOM and inventory status files,

   (d) Strategies for capacity expansion,

   (e) Flow shop and job shop scheduling,

   (f) Lot sizing rules.

7.(a) The following table shows the processing times for 6 jobs on 4 machines. Use Dannenbring's exhaustive search (DES) algorithm to determine the total make span time. (10)

Machine / Job	1	2	3	4
1	2	3	6	1
2	3	7	4	6
3	2	5	6	7
4	5	3	2	5
5	6	4	6	3
6	1	8	3	4

b) In a job shop scheduling problem, the sequence of using 3 machines for 6 jobs and the processing times are shown in the following table. Determine the make span time. (10)

Job	Machine sequence	Processing times (in hours)
1	1,3	1,2
2	2,3	2,5
3	3,1,2	2,1,1
4	1,2,3	1,1,2
5	3,1	4,2
6	1,2,3	2,2,4