

Three Hours

Total Marks: 80

Instructions:

- Question No. 1 is compulsory
- All questions carry equal marks
- Assume suitable data wherever necessary
- Explain with figures and diagrams wherever necessary
- Figures to the right indicate full marks.
- Answers to the questions should be grouped and written together.

- Q.1** Explain in brief. (Any Four) **20**
- Discuss the prerequisites of PPC
  - State the assumptions in job sequencing
  - State the objectives and inputs to the MRP system
  - Fixed quantity system (Q-system)
  - Measures of capacity
  - Assembly Line Balancing
- Q.2 a.** The Handy-Dandy Department Store had forecast sales of Rs.110000 for the last week. The actual sales turned out to be Rs.125000. **10**
- What is the forecast for this week, using exponential smoothing?  
Assume  $\alpha = 0.1$
  - If sales this week turn out to be Rs.120000, what is the forecast for the next week?
- b.** A firm produces wheel barrows is expected to deliver 40 wheel barrows in week 1 ,60 in week 4, 60 in week 6 and 50 in week 8 .Among the requirements for each wheel barrow are two handle bars, a wheel assembly and one tire for the wheel assembly. Order quantities, lead times and inventories on hand at the beginning of period 1 are shown in table **10**

Part	Order Quantity	Lead Time	Inventory on Hand
Handle bars	300	2 weeks	100
Wheel Assembly	200	3 weeks	220
Tires	400	1 week	50

Draw product structure and complete the MRP for handle bars, wheel assembly and tires.

- Q.3 a.** The following table shows the details of a project involving 11 activities. **10**

Activity	Predecessor	Duration (weeks)		
		$t_o$	$t_m$	$t_p$
A	---	6	7	8
B	---	1	2	9
C	---	1	4	7
D	A	1	2	3
E	A,B	1	2	9
F	C	1	5	9
G	C	2	2	8
H	E, F	4	4	4
I	E, F	4	4	10
J	D, H	2	5	14
K	I, G	2	2	8

- i) Construct the project network
- ii) Find the expected duration and variance
- iii) Find the critical path and expected project completion time
- iv) What is the probability of completing the project on or before 25 weeks?

**b.** Why is it important to monitor and control forecasts? 10  
 What is aggregate planning? Explain different strategies of aggregate planning?

**Q.4 a.** A company currently purchases one of its items for Rs.2 per unit without quantity discount. 10  
 The ordering cost is Rs.20 per order and the carrying cost is 20% of its purchase price per unit per year. The annual demand is 2500 units. A new vendor offers quantity discounts for the same item as per the following quantity discount scheme. Find the best order quantity.

Quantity	Discount per unit
$0 \leq Q_1 < 1500$	No discount
$1500 \leq Q_2 < 2500$	3 % of per unit price
$2500 < Q_3$	5 % of per unit price

**b.** Define project scheduling. Explain importance of scheduling in project planning. 10  
 Differentiate between CPM and PERT.

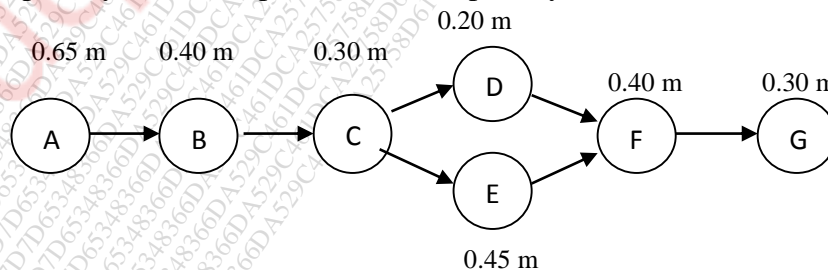
**Q.5 a.** There are seven jobs, each of which has to be processed on machine A and on machine B 10  
 (order of machining is AB). Processing time is in hours. Find the optimal sequence in which the jobs are to be processed so as to minimize the total time elapsed.

Job →		1	2	3	4	5	6	7
M/c A (Time in Hours)		3	12	15	6	10	11	9
M/c B (Time in Hours)		8	10	10	6	12	1	3

**b.** Use the sales data given below to determine: 10  
 i) the least squares trend line, and  
 ii) the predicted value for 2019 sales.

Year	2012	2013	2014	2015	2016	2017	2018
Sales(units)	100	110	122	130	139	152	164

**Q.6 a.** The precedence diagram for assembly activities A to G is shown below. The element times required for the activities are shown in the diagram in minutes. The line operates for seven hours per day and an output of 550 units per day is desired. 10



- i) Calculate the cycle time and the theoretical minimum number of workers.
- ii) Group the tasks into an appropriate number of work stations by Kilbridge and Westers Method.
- iii) Also calculate the balanced efficiency.

**b.** Explain the evolution of ERP. What is the purpose of modeling an enterprise? 10

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