13/05/2025 MECHANICAL SEM-VIII C-SCHEME OPC QP CODE:10082955

Time: 3 hrs **Marks: 80**

N. B.: 1. Question 1 is Compulsory
2. Attempt any three questions out of the remaining five.
3. All questions carry equal marks.
4. Assume suitable data, if required and state it clearly.

Q1 Attempt any FOUR 20

1. Write a short note on Synchronous Manufacturing.
2. Short Note on ERP Packages
3. Role of buffer stock in inventory control
4. Write short notes on Shop Floor Control.
5. Explain Pure strategy and Mixed Strategy in aggregate planning
6. Explain Quasi Manufacturing

Q2 (a) Manufacturer needs to balance an assembly line for producing a product. The tasks, their durations (in minutes), and their immediate predecessors are given below: 10

Task	Task Time (Minutes)	Intermediate Predecessors
A	4	-
B	5	A
C	3	A
D	6	B
E	4	C
F	5	D,E
G	2	D

The total available working time per day is 480 minutes, and the production requirement is 60 units per day. The company needs to find: (i) The cycle time. (ii) The minimum number of workstations required.
A task assignment that balances the line.

Q2 (b) Explain construction of Critical Path Method (CPM) and how to determine critical path in the network diagram with 10 events case study? 10

Q3(a) How can lean manufacturing principles help to reduce waste and improve operational efficiency? 10

Q3 (b) There are 6 jobs (A, B, C, D, E, F) that need to be processed on four machines (**M1**, **M2**, **M3**, **M4**), in a specific sequence. The processing times (in hours) for each job on all machines are given as follows: 10

Job	**M1 (hours)**	**M2 (hours)**	**M3 (hours)**	**M4 (hours)**
A	5	8	6	7
B	4	6	7	5
C	6	5	8	6
D	7	4	5	8
E	5	7	6	5
F	3	6	4	7

(i) The optimal sequence for processing the jobs.
(ii). The total elapsed time (make span).
(iii). The idle time for each machine.

Q4a) A construction project consists of several activities with their respective durations and dependencies. The project manager needs to determine the following: (i).The critical path and project completion time. (ii) The early start (ES), early finish (EF), late start (LS), and late finish (LF) for each activity. (iii) The total float (slack) for each activity. The activities, their durations, and their dependencies are shown in the table below: 10

Activity	Duration (days)	Predecessor(s)
A	4	-
B	7	A
C	6	A
D	5	B, C
E	10	B
F	3	C
G	2	D, E
H	7	F
I	4	G, H

Q4b) What is aggregate planning? Explain aggregate planning strategies in detail 10

Q5a) A company manufactures and sells a specialized electronic component. The annual demand for the component is 12,000 units. The company operates 250 days a year. The following data is available: Ordering cost per order: Rs.50. Holding cost per unit per year: Rs.2 Lead time: 5 days. Safety stock: 10% of the daily demand during the lead time Stock-out cost (per unit per stock-out): Rs.8. Unit price: Rs.25. Standard deviation of daily demand: 8 units. The company wants to determine the following: The optimal Economic Order Quantity (EOQ). The Total Inventory Cost (TIC) (including ordering cost, holding cost, and stock-out cost). The Reorder Point (ROP), accounting for safety stock and variability in demand during the lead time. The expected number of stock-outs per year. 10

Q5b) How does the Enterprise Resource Planning (ERP) **model integrate with** Operations Planning and Control (OPC)?

Q6a) Explain any Two Modules (i) Master Production Schedule (MPS) (ii) Material Requirement Planning (MRP) (iii) Capacity Requirement Planning (CRP)

b} Explain Synchronous manufacturing: systems in detail.