

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:

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.

B.E. MECH / SEM-VIII / R-19 / F.H: 2025 / 15-05-2025

Paper / Subject Code: 53372 / Composite Materials (DLOC - V)

Program Code - 1T01438
R.P. Code - 10084060

Time: 3 hours

Max. Marks: 80

- Note: 1. Assume suitable data if necessary
2. Figures to the right indicate full marks
3. Question No. 1 is compulsory
4. Solve any three out of the remaining five questions

- Q1. Solve any four**
- A Explain the phenomenon of composite materials 5
B Explain the stiffness and compliance matrix for Anisotropic and Orthotropic materials. 5
C Explain the Plain stress assumption for composite lamina. 5
D Explain the laminates codes 5
E Write short note on mechanical properties of Lamina 5
F Explain with neat diagram all the levels of a generic repair design. 5
- Q2.**
- A Derive an expression of Hook's law for a Two-Dimensional Unidirectional lamina. 10
B Explain with neat diagram the working of spray Lay-up method for composite materials with advantages and disadvantages. 5
C Write short note on significance of strength ratio 5
- Q3.**
- A Differentiate between Vacuum Infusion and Vacuum Bagging techniques for composite manufacturing on the basis of diagram, set-up, operation, advantages, disadvantages and applications. 10
B Illustrate with neat sketch the Radiographic Inspection method 5
C Explain the selection criteria for repair methods for composites. 5
- Q4.**
- A Derive an expression of failure criteria with failure envelope according to Maximum Strain theory. 10
B Illustrate with neat sketch the ultrasonic method of inspection for composites. 5
C Explain repair method in composites. 5
- Q5.**
- A Differentiate between the passive and active methods of thermography inspection based on principle, construction, working, pros and cons of methods. 10
B Write short note on repair criteria 5
C Illustrate with neat sketch the resin transfer moulding technique. 5
- Q 6.**
- A Explain various types of defects may occur in composite parts 10
B Write short note on Laminate Design 5
C Explain Industrial Autoclave 5

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X822YA7DC65X822YA7DC65X822YA7DC65X822YA7DC65

3 hours

80 Marks

Instructions:

1. Question Number 1 is Compulsory
2. Attempt ANY THREE Questions out of remaining FIVE
3. Use illustrative diagrams wherever required

- Q1) Attempt any FOUR questions
- a) What is the need of new product development in the world? 05
 - b) What Is Product Architecture? 05
 - c) Draw the flow chart of Concept Development Process in the product design. 05
 - d) Why it is necessary to integrate the basic forms and elements of a product like balance, rhythm and proportion? 05
 - e) What are the principles of Design for Manufacturing and Assembly (DFMA)? 05
 - f) List ANY FIVE Prototyping techniques used in manufacturing a product. 05
- Q2) a) Explain SIX steps/phases of the Generic product development process with flow chart. 10
- b) Define market research. List and explain the methods of market research required in the product design and development. 10
- Q3) a) What do you mean by concept selection? Explain concept screening and concept scoring methodology giving example. 10
- b) What Is Product Architecture? Explain the Steps in developing product architecture. 10
- Q4) a) Explain the process of identifying customer needs in concept development process. 10
- b) What is Quality Function Deployment (QFD)? Explain the phases of QFD. 10
- Q5) a) Draw House of Quality (HoQ) and highlight the customer matrix part in (HoQ)? Explain Voice of the Customer as an input to QFD. 10
- b) Define creative thinking. List any FIVE Creativity and problem-solving methods. Explain the Brainstorming Technique used in product development. 10
- Q6) a) What is balance, rhythm and proportion? Explain the importance of these elements in product design and development giving examples. 10
- b) Write short notes on Design for Environment and Design for Serviceability. 10

[Time: 3 Hours]

[Marks:80]

1. Questions No. 1 is Compulsory.
2. Attempt any three out of remaining Questions.
3. Figures to the right Indicate full marks.

Q.1 Attempt any Four.

- a) Explain any five Salient features of the Environment Protection Act, 1986. 20
- b) Describe the current energy scenario in India. What challenges does India face in meeting its energy demands?
- c) What is a food chain? How does it differ from a food web?
- d) What are atomic and biomedical hazards?
- e) Explain the role of the government as a planning and regulatory agency.

- Q.2 a) Discuss major environmental problems in India and their implications for public health and natural resources. 10
- b) Explain Ozone layer depletion? What are the Causes, effects and preventive measures of Ozone depletion? 10

- Q.3 a) Define ecosystem. Classify different types of Ecosystems? What are the biotic and abiotic components of an ecosystem? 10
- b) Discuss the role of Central Pollution Control Board (CPCB) in pollution monitoring. 10

- Q.4 a) What is ISO 14000? Explain its significance in environmental management and how it helps organizations reduce their environmental impact. 10
- b) What is Corporate Environmental Responsibility (CER)? Explain its importance and mention any three ways in which companies can practice CER to promote environmental sustainability. 10

- Q.5 a) Compare natural and human-made sources of greenhouse gases. Which ones have the greatest impact on global warming and why? Support your answer with examples 10
- b) What is Environmental Quality Management (EQM)? Explain its objectives in detail. 10

- Q.6 a) With reference to EMS, explain PDCA cycle with neat diagram. 10
- b) Critically evaluate the concept of sustainable development as a multidimensional approach. How does it reconcile the conflicting goals of economic growth, environmental conservation, and social equity? 10