

**Duration: 3 Hours**

**Total Marks: 80**

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.

**Q 1** Answer **any four** questions

**20**

1. Draw Production systems line sketch and list out production system components
2. List out Production planning and control functions
3. Explain Product Life cycle with diagram
4. Explain various terms associated with line balancing.
5. Write notes on MRP flow chart
6. Explain the objectives of Facility planning.

**2 a)** A company manufactures the consumer durable products and the company intends to develop an aggregate plan for six months starting from January through June. The following information is available.

**10**

<i>Month</i>	Jan	Feb	Mar	Apr	May	Jun
<i>Demand</i>	500	600	650	800	900	800
<i>Working days</i>	22	19	21	21	22	20

**Cost Details**

Materials Rs. 100/unit, Inventory carrying cost - Rs. 10/unit/month,  
 Cost of stock out Rs. 20/unit/month, cost of subcontracting Rs.200/unit,  
 Hiring and training cost Rs. 50/worker, Lay off cost Rs.100/ worker,  
 Labor hours required Rs. 4/unit, Regular time cost (for first 8hours) Rs.12.50/-per hour  
 Over time cost Rs.18.75/- Per hour, Beginning inventory 200 units. Safety stock required -Nil

**Work out the cost of the constant work force – Varying inventory and allow shortages Strategy**

**Q2 b)** Define (i) Design capacity (ii) System capacity (iii) Installed capacity (iv) Licensed capacity (v) Rated capacity

**10**

**Q3 a)** Define process design and explain the framework of process design by means of a block diagram?

**10**

**Q3 b)** The following data refers to the past sales of one product. **10**

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023
Sales in Lakhs	3.9	5.4	6.2	7.3	8.5	10	9.5	10.5	12

Use Least square method and estimate sales forecasting of year 2024

**Q4 A)** Seven jobs are to be processed through three machines A,B and C in the sequence ABC. The processing times are given in hrs to process each one of the jobs through all the three machines. Find the optimal sequence of the jobs that minimizes the total elapsed time and find idle time associated with machines B and C **10**

Jobs	J1	J2	J3	J4	J5	J6	J7
A	3	8	7	4	9	8	7
B	4	3	2	5	1	4	3
C	6	7	5	11	5	6	12

**Q4 B)** . Explain the various terms associated with MRP. Explain the steps of creating MRP master schedule with any end item X. **10**

**Q5 A)** 4.) A small project is composed of time activities whose time estimates are given below **10**

Activity	A	B	C	D	E	F	G	H	I
$t_o$	2	2	4	2	2	3	2	5	3
$t_m$	2	5	4	2	5	6	5	8	6
$t_p$	8	8	10	2	14	15	8	11	15

$t_o$  - Optimistic time,  $t_m$  Most likely time,  $t_p$  - Pessimistic time , Activity A,B and C can start simultaneously. Activity D follows activity A while E follows B. Activity D and E are followed by activity G while F is dependent on C , H depends on D and E While I depends on F and G (i) Construct the network diagram (ii) determine Expected time and variance (iii) What is the critical path and expected project duration of the project

**Q5 B)** Define plant layout? What are the various types of layout? Explain the application of each layout **10**

**Q6 (A)** Explain ERP modules for operation planning and materials management **10**

**Q6 B)** Explain Agile Manufacturing systems with block diagram and features compare with other production system **10**

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Time: 3 hours

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 | Write short note on scope of composite materials in various sectors.                 | 5 |
| B | Explain the stiffness and compliance matrix for Isotropic and Anisotropic materials. | 5 |
| C | Explain the Plain stress assumption for composite lamina                             | 5 |
| D | Write short note on Strength ratio   | 5 |
| E | Explain with suitable examples various criteria for composites repair works.         | 5 |
| F | Explain with neat sketch various the levels of a generic repair design.              | 5 |
- Q2.**
- |   |  |    |
|---|--|----|
| A | Derive an expression of Hook's law for a 2D Unidirectional lamina.   | 10 |
| B | Explain with neat diagram the working of hand lay-up method for composite materials with advantages and disadvantages. | 5  |
| C | Write short note on Powder metallurgy route for ceramic and metal matrix composites                                    | 5  |
- Q3.**
- |   |  |    |
|---|--|----|
| A | Differentiate between Resin Transfer Moulding and Vacuum Infusion techniques for composite manufacturing on the basis of diagram, set-up, operation, advantages, disadvantages and applications. | 10 |
| B | Write short note on surface preparation for composites.  | 5  |
| C | Illustrate with neat sketch the matrix cracks repair method in composites.   | 5  |
- Q4.**
- |   |  |    |
|---|--|----|
| A | Derive an expression of failure criteria with failure envelope according to Maximum Stress theory. | 10 |
| B | Illustrate with neat sketch the ultrasonic method of inspection for composites.                    | 5  |
| C | Explain the laminates codes of [0/-45/70/-45/0] and [0/45/-30]s                                    | 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 | Explain Tsai-Hill failure theory for 2D composite lamina   | 5  |
| C | Illustrate with neat sketch of autoclave technique for composites preparation  | 5  |
- Q 6.**
- |   |   |    |
|---|---|----|
| A | Classify and briefly elaborate various types of defects may occur in composite parts. | 10 |
| B | Explain repair techniques for Delaminations in composites.                            | 5  |
| C | Explain various types of laminates with their codes.                                  | 5  |

Time: 3 hour

Max. Marks: 80

Note-

1. Question one is compulsory.
2. Solve any three out of remaining five.

- Q.1 Explain any four of the following. 20**
- a Definition of Product quality and service quality
  - b Significance of Quality management
  - c Draw diagram Root cause analysis
  - d List out Barriers to TQM work
  - e Explain Win –Win policy with supplier.
- Q.2 a The data shows the sample mean and range for 10 samples for size 5 each. Find the control limits for mean chart and range chart. 10**

Sample	1	2	3	4	5	6	7	8	9	10
Mean	21	26	23	18	19	15	14	20	16	10
Range	5	6	9	7	4	6	8	9	4	7

- Q.3 a Explain Quality management system certification process 10**
- a Explain Six sigma definition, concept and methodology 10**
- b Explain various steps involves implementing TQM in manufacturing industries with case study 10**
- Q.4 a What is ISO 9000? Explain ISO 9000 system implementation process. 10**
- b Describe the contribution of Tauguchi to quality management. 10**
- Q.5 a Explain the purpose of giving Malcom Baldrige quality award. 10**
- b Explain the following charts 10**
- (i) Producer risk
  - (ii) Consumer risk
  - (iii) AQL
  - (iv) LTPD
- Q6 a 1.Explain the Barriers of TQM? 5**
- 2.Write note on cost of quality 5**
- b What is BPR concept? List out the process involves in the BPR concept implementation 10**

3 Hours

Marks : 80

**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) | Define new product. List various types of new products.  | <b>05</b> |
| b) | Draw figure showing the steps or phases of the product development process.                            | <b>05</b> |
| c) | Define Quality Function Deployment (QFD). List the steps of QFD.                                       | <b>05</b> |
| d) | Differentiate between engineering design and industrial design.  | <b>05</b> |
| e) | What do you mean by golden ratio of proportion? Give examples of golden ratio uses in day-to-day life. | <b>05</b> |
| f) | Explain the term Design for Environment.   | <b>05</b> |

**Q2)** a) What is product life cycle? Explain the four phases of product life cycle with diagram. **10**  
 b) Define market research. Explain the methods of market research required in the product design and development. **10**

**Q3)** a) For redevelopment of a consumer product “college backpack”, prepare concept selection matrix. Generate the concept, screen the concept, score the concept and rank the concept. **10**  
 b) Explain in brief various concept generation and selection methods. **10**

**Q4)** a) What is House of Quality (HoQ)? Explain various components of HoQ. **10**  
 b) Draw House of Quality (HoQ) for a consumer product “college backpack”. **10**

**Q5)** a) Define creative thinking and creativity. List the Creativity and problem-solving methods. Explain any ONE method. **10**  
 b) What are the basic forms and elements of a product? Why it is necessary to integrate the basic forms and elements? Explain with examples. **10**

**Q6)** a) What is DFMA? Explain the steps used in DFMA giving examples. **10**  
 b) Write short notes on **05**  
     a) 3 D printing method  
     b) Role of computers in product design and manufacturing **05**

(Time: 3 Hours)

(Total Marks: 80)

Note:

1. Question No.1 is compulsory
2. Attempt any **three** out of the remaining **Five** questions.
3. Assume suitable data if necessary.

- Q. 1.** Answer **any FOUR** of the following: (20)
- (a) Define Environmental Objective as per ISO 14001
  - (b) What are the challenges in implementation of ISO 14000 standards?
  - (c) Unawareness or ignorance of environmental protection will lead to detrimental consequence comment. Justify the statement.
  - (d) Write short note on Global Warming as a Global Environmental Concern.
  - (e) Discuss on Applications of Environmental Management System..
  - (f) Discuss the key success factors for applied to almost all the operation for EMS implementation.
- Q. 2.** (a) What is Water (P & CP) Act? Give its objectives. (10)
- (b) Discuss in short about Environment Protection Act. (10)
- Q. 3.** (a) Discuss roles of Government as regulatory agency for Environmental Management. Enlist 3 points. (10)
- (b) Explain limiting factors and carrying capacity as related to Ecosystems. (10)
- Q. 4.** (a) What is Total Quality Environment Management Concept? (10)
- (b) How is CSR related to Environmental Management? Explain with an example. (10)
- Q. 5.** (a) Elaborate the ISO 14001 EMS Model for Municipalities. (10)
- (b) Discuss in short about EMS certification. (10)
- Q. 6.** Answer the following (20)
- (a) Discuss on Wildlife protection Act.
  - (b) What are the guidelines to conduct and Environmental audit?