QP code: 10082955

Paper / Subject Code: 53371 / Operations Planning and Control

BE sem VIII Mechanical R-19 C scheme

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.

BE sem VIII Mechanical R-19 C scheme QP 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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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**

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QP code : 10085904

BE sem VIII Mechanical R-19 C scheme

Time: 3-hour Max. Marks: 80

N.B.: (1) Question **NO. 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.
(5) Notations carry the usual meaning.

Q. 1 Answer any **FOUR.** **20**

a. Explain the necessity of project management in achieving organizational goals.

b. What is Goldratt's critical chain method?

c. What are the numeric and non-numeric models of project selection?

d. What is concurrent engineering?

e. Explain various Reasons for project termination.

f. Define scope creep. What are two ways to control it in a project?

Q.2 a. Describe the typical and atypical project life cycles, highlighting the stages in the stage-gate process. **10**

b. Assume that ABC Inc. is considering two projects, namely Project X and Project Y, and wants to calculate the NPV for each project. Both project X and project Y are four-year projects, and the cash flows of both projects for four years are given below: **10**

Year	Project A Cash Flows in Rs.	Project B Cash Flows in Rs.
1	5000	1000
2	4000	3000
3	3000	4000
4	1000	6750

The firm's cost of capital is 10% for each project, and the initial investment amount is Rs.10,000. Calculate the NPV of each project and determine in which project the firm should invest.

Q.3 a. What are the advantages and risks of outsourcing in project management? **05**

b. List the key components of a project communication plan. **05**

c. Describe the methods of project cost estimation and differentiate between top-down and bottom-up budgeting approaches. **10**

Q.4 a. What are the different types of contracts? Draw the graph showing risk exposure to the buyer and seller in various contract types. **10**

10

b. A small project consisting of ten activities has the following characteristics:

Activity	Preceding Activity	Time Estimate weeks		
		Optimistic	Most likely	Pessimestic
A	–	4	5	12
B	–	1	1.5	5
C	A	2	3	4
D	A	3	4	11
E	A	2	3	4
F	C	1.5	2	2.5
G	D	1.5	3	4.5
H	B,E	2.5	3.5	7.5
I	H	1.5	2	2.5
J	F, G, I	1	2	3

Determine the critical path.

Q.5

a. Explain the Probability and impact matrix. What are the risk response strategies for negative risks(threats) and positive risks(opportunities). 10

b. Explain the four stages of team development and growth. 10

Q.6

a. Discuss the various reasons for project termination and explain different types of project termination. 10

b. Explain the importance of ethics in projects. 05

c. Explain the Triple constraint of project management in brief. 05
