

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. In case of rough work, please use answer sheet.

Section A: Short answer questions (Five marks each. Attempt three; total marks 15)

- A1.
- a. What are competitive priorities (or, performance objectives)? (Marks 3)
 - b. Can you explain the concept of trade off using one example? (Marks 2)
- A2. A BMW and an Alto can have comparable quality. Do you agree with this statement? Explain.
- A3. Are you in favour of standardization (commonization) in product design? What are the advantages of design standardization?
- A4. How are services classified on the basis of labour intensity and customization? Give two examples of each category.
- A5. The activity matrix of a research laboratory is exhibited below:

		To departments					
		A	B	C	D	E	F
From departments	A		15	35	20	40	50
	B	10		20	20	50	10
	C	15	0		40	40	20
	D	10	15	30		10	10
	E	30	0	40	10		10
	F	50	20	0	0	30	

Evaluate following two proposed layouts and recommend one of these.

Layout 1		
B	C	E
D	A	F

Layout 2		
B	E	C
D	A	F

Section B: 10 marks each. Attempt any 2; total marks 20

B1. Answer the following based on EOQ.

- (a) State any three assumptions of the EOQ model. (3 marks)
 (b) A supplier of valve # 1234 has offered quantity discounts for purchasing more than the present order quantities. The new volumes and prices are :

Range of Order Qty.	Price per Unit Valve
1 – 399	Rs. 2.20
400-699	Rs. 2.00
700+	Rs. 1.80

What quantity should be ordered? Given: Demand, $D = 10,000$ valves per year; inventory carrying charge $C = 20\%$ of value carried per year; ordering cost = Rs. 5.50 / order. What would be the total annual cost for this order quantity? (7 marks)

B2. Consider the following project information

Activity	Activity Time (Week)	Immediate predecessors
A	4	--
B	3	--
C	5	--
D	3	A,B
E	6	B
F	4	D,C
G	8	E,C
H	12	F,G

- (a) Draw the network diagram for this project. (3 marks)
 (b) Specify the critical path(s). (2 marks)
 (c) Calculate the total slack for the activities A & D. (5 marks)

B3. Answer the following questions

- (a) Give five differences between a process layout and a product layout. (5 marks)

- (b) The cost of doing things wrong exceeds that of doing things right. Do you agree? Explain with respect to the costs of quality. (5 marks)

Section C: 15 marks

C1. A company is developing an aggregate plan from the sales forecast given below.

Product	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
A	2000	1500	1600	1800
B	1200	1000	800	1000

Each unit of Product A takes an average of 20 labour hours and each unit of Product B takes an average of 15 labour hours to make.

It costs Rs.1200 to hire a worker and Rs.600 to lay off a worker. Annual inventory carrying cost is Rs.100 for each unit of Product A and Rs.100 for each unit of product B (this means that if 1 unit of either A or B is held in inventory for 1 year, it would cost Rs.100). The plant works for 13 five-day weeks in each quarter (i.e., 65 days/quarter). Assume that the plant works for 8 hours (regular) each day. It is given that the opening inventory at the beginning of the 1st quarter is 275 for Product A and 200 for Product B.

- a. Evaluate a level production plan with inventory.
 - i. How many units of A and B will you produce in each quarter? (4 marks)
 - ii. What would be the opening and closing inventories of A and B in each quarter? (2 marks)
 - iii. What is the total cost of this plan? (2 marks)
- b. Evaluate a 'chase' strategy that matches the quarterly demand by hiring/firing workers. Assume that there is no opening inventory of A and B in this case.
 - i. Assuming that you start the first quarter with as many workers as needed for the demand for that quarter, how many workers will you start with (note that these workers are already on rolls, they are not hired in 1st quarter)? (4 marks)
 - ii. What is the cost of this plan? (2 marks)
- c. Which of the two plans will you select? (1 mark)