Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA - SEMESTER - II EXAMINATION - SUMMER 2025

Subject Code: MB02092051 **Date: 10-06-2025**

Subject Name: Production & Operations Management

Time: 10:30 AM TO 01:30 PM **Total Marks: 70**

Instructions

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

4. USE of SIMPLE calculators AND non-programmable scientific calculators are permitted.

			Marks
Q.1		Explain the terms and concepts	**14**
	(a)	Give names of some priority rules for n job – 1 machine sequencing	
	(b)	At EOQ which two costs are equal?	
	(c)	Give four industry examples of Fixed Position layout.	
	(d)	What is Job Shop Process?	
	(e)	List different types of Queuing Behavior?	
	(f)	What is Six Sigma quality standard?	
	(g)	What is JIT?	
Q.2	**(a)**	Explain Functions view of an organization.	**07**
	(b)	Explain with practical examples of real businesses, different Product Strategies like MTS, MTO, and ATO.	**07**
		OR	
	(b)	Explain Assembly Line Manufacturing and Continuous Manufacturing processes with merits, demerits and real products examples	**07**
Q.3	**(a)**	Explain Inputs, Processing and Outputs of MRP System.	**07**
	(b)	A manufacturing company uses a component in its assembly line. The following data is given: Annual demand (D): 3,60,000 units Ordering cost per order (S): ₹200 Carrying cost per unit per year (H): ₹25 Calculate a) EOQ b) Average Inventory & Number of Orders per annum c) Total Ordering Cost & Total Carrying Cost d) Total Cost	**07**
		OR	

(a) Which criteria are considered while deciding the location of a new manufacturing units? **07**

(b) A company manufactures metal rods with a target diameter of 20.00 mm. Samples of size 5 are taken hourly, and the sample means and ranges for 6 samples are recorded as follows: **07**

Sample #	1	2	3	4	5	6
Mean ($\bar{X}$)	20	20.14	19.97	20.02	20	19.95
Range (R)	0.03	0.03	0.03	0.04	0.03	0.03

Calculate

a) $\bar{\bar{X}}$ (average of sample means)

b) $\bar{R}$ (average of sample ranges)

c) Control Limits for $\bar{X}$ chart.

d) Control Limit for R chart.

Take Control Chart Constants (n = 5):

A2 = 0.577, D3 = 0, D4 = 2.114

Q.4 **(a)** Explain Cost of Quality. **07**

(b) There are six jobs to be processed on 3 machines for which the time in days is given below. **07**

Job	J1	J2	J3	J4	J5	J6
M1	5	8	6	4	9	7
M2	7	4	9	8	6	5
M3	6	7	5	9	4	8

Find

a) Optimal Job Sequence.

b) Start and End times of each job on all machines and the make span.

OR

(a) Explain with examples different dimensions of quality. **07**

(b) A small coffee kiosk in a business plaza has one serving attendant. Customers arrive at the kiosk randomly at an average rate of 12 customers per hour. Each customer takes an average of 4 minutes to be served. **07**

Calculate

a) Utilization factor (ρ) of the server

b) Average number of customers in the queue (Lq)

c) Average number of customers in the system (Ls)

d) Average waiting time in the queue (Wq)

e) Average time a customer spends in the system (Ws)

Q.5 **Consider the following project:**

Activity	A	B	C	D	E	F	G	H	I
Predecessor(s)	—	A	B	C	A	E	D, F	G	H
Optimistic (O)	2	1	2	3	1	2	2	1	1
Most Likely (M)	4	2	3	5	3	4	3	2	2
Pessimistic (P)	6	4	5	8	4	6	6	3	4

Keeping the PERT project in mind answer

(a) Draw the project network diagram showing activities on arrows (AOA) and all the three times. **07**

(b) Find the expected times and variances of each activity **07**

OR

(a) Find the Critical Path of the project and the Duration of Critical path **07**

(b) Find the Probability to complete the project in 21 days? (Take Area under standard Normal Curve for Z = 0.64 as 0.2389) **07**

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Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA - SEMESTER - II EXAMINATION - WINTER 2025

Subject Code: MB02092051 **Date: 21-01-2026**

Subject Name: Production & Operations Management

Time: 02:30 PM TO 05:30 PM **Total Marks: 70**

Instructions

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

4. USE of SIMPLE calculators AND non-programmable scientific calculators are permitted.

			Marks
Q.1			**14**
	(a)	Shop floor control	
	(b)	JIT	
	(c)	Lean Manufacturing	
	(d)	Push system	
	(e)	Subcontracting or outsourcing	
	(f)	Effective Capacity	
	(g)	Automation	
Q.2	**(a)**	Briefly discuss safety management.	**07**
	(b)	A Pizza Delivery Service is considering to locate its business in your city.Enlist the factors which this service should take into consideration while locating in your city.	**07**
		OR	
	(b)	A manufacturing unit has an annual demand of 60,000 units of a raw material. The company operates for 48 weeks in a year. The ordering cost is ₹400 per order, and the cost per unit of the raw material is ₹20. Inventory carrying cost is 12% of the unit price. The lead time for procurement is 4 weeks. The company maintains a safety stock equal to 15% of EOQ. Calculate Economic Order Quantity (EOQ), Safety Stock, Reorder Level, Minimum Inventory Level, Maximum Inventory Level.	**07**
Q.3	**(a)**	Define operations management. Describe input – transformation - output relationship in an automobile factory.	**07**

(b) Cetrox limited manufactures 7 products which have to be processed on 2 work centers (W1 and W2 in sequence). The processing times(in days) required by the products on the two work centers are in the table. Sequence these jobs using Johnson's method. Also find out waiting time of the jobs and idle times of the machines. **07**

JOB	W1	W2
A	8	5
B	6	3
C	10	7
D	11	12
E	10	8
F	14	6
G	4	7

OR

(a) Which manufacturing method—intermittent or continuous—is more effective for producing customized products, and why? **07**

(b) Assume that at a bank teller window the customer arrival rate of 20 per hour according to Poisson distribution. Also, that the bank teller spends on an average of 2 minutes per customer to complete a service and the service time is exponentially distributed. Customers, who arrive from an infinite population, are served on a first come first served basis. **07**

1. What is the expected waiting time in the system per customer?
2. What is the mean number of customers waiting in the queue?
3. What is the probability of zero customers in the system?
4. What value is the utilization factor?

Q.4 **(a)** Define the various types of plant layout in brief with suitable examples of each. **07**

(b) The owner of a chain of fast food restaurants is considering a new computer system for inventory control. A company spent the following information about the system installation.Find the critical path of the project and its expected duration. **07**

Activity	Immediate Predecessors	Most Optimistic	Most Likely	Most Pessimistic
A	-	4	6	8
B	A	5	7	15
C	A	4	8	12
D	B	15	20	25
E	B	10	18	26
F	C	8	9	16
G	E	4	8	12
H	D,F	1	2	3
I	G,H	6	7	8

OR

(a) What are the key differences between level strategy and chase strategy in Aggregate Production Planning formulation? **07**

(b) For a project consisting of several activities, the duration of each activity is given below.Draw the network diagram and identify the critical path.Obtain the forward and backward pass calculation. **07**

Activities	Duration (Days)
1-2	4
1-3	3
1-4	6
2-4	4
2-5	8
3-4	4
3-5	4
4-5	6

Q.5 Stellar Electronics, a mid-sized manufacturer of consumer electronics in Pune, began facing increasing customer complaints related to product durability and service delays. An internal review exposed root causes such as inconsistent quality control, poor inventory practices, and fragmented interdepartmental coordination.

In 2022, Stellar's leadership launched a combined initiative centered around Total Quality Management (TQM) and Just-in-Time (JIT) production to address these issues. TQM was aimed at instilling a company-wide quality culture, while JIT was introduced to reduce waste and inventory holding costs.

Under TQM, the company formed cross-functional Quality Circles, launched employee training in Six Sigma tools, and created a real-time dashboard to monitor defects, returns, and service metrics. Meanwhile, JIT principles were applied by coordinating tighter schedules with suppliers, minimizing buffer stock, and synchronizing production with real-time demand.

As a result, product return rates dropped by 40%, and customer satisfaction improved by 25%. Inventory costs were reduced by 30% due to JIT implementation. Employee engagement rose, and communication across departments improved.

Challenges included initial resistance from staff, time spent on training, and ensuring supplier compliance with JIT timelines. Stellar's initiative demonstrated how aligning TQM and JIT can deliver better quality, lower costs, and a more agile production environment.

(a) What measurable improvements did Stellar experience after implementing TQM and JIT? **07**

(b) To what extent were the operational problems faced by Stellar Electronics indicative of a need for TQM and JIT implementation? Justify your evaluation **07**

OR

(a) What challenges did the company face during the transition to TQM and JIT practices? **07**

(b) How effective was Stellar's application of Total Quality Management and Just-in-Time production principles in addressing its operational challenges? Support your evaluation with evidence. **07**

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