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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST –1**

**Sem AY: Odd Sem 2019-20**

**Course Code: MEC 304**

**Course Name: PRODUCTION PLANNING AND CONTROL**

**Program & Sem : B.Tech (MEC) & V DE**

**Date: 27.09.2019**

**Time: 11:00AM to 12:00 PM**

**Max Marks: 40**

**Weightage: 20%**

**Instruction:**

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted.

**Part A**

**Answer all the Questions. Each question carries four marks. (3Qx4M=12M)**

1. What is Standardization and Simplification in Product development?  
(C.O.NO.1)[Knowledge]
2. List out the benefits of Production planning and control  
(C.O.NO.1)[Knowledge]
3. Differentiate between Production planning and control  
(C.O.NO.1)[Knowledge]

**Part B**

**Answer all the Questions. Each question carries six marks. (3Qx6M=18M)**

4. Explain the concept of Push and Pull system used in any organization  
(C.O.NO.2)[Comprehensive]
5. Describe the different phases of Production planning and control  
(C.O.NO.1)[Comprehensive]

6. Explain seven waste management used by Toyota Production system

(C.O.NO.2)[Comprehensive]

**Part C**

**Answer the Question. The Question carries ten marks.**

**(1Qx10M=10M)**

7. The following data are given for a company estimated output = 80,000 units. Fixed cost = Rs. 4,00,000 Variable cost = Rs. 10 per unit selling Price = Rs. 20 per unit. Find out the break-even point analytically and graphically

(C.O.NO.1)[Comprehensive]





K =Knowledge Level C = Comprehension Level, A = Application Level

Note: While setting all types of questions the general guideline is that about 60%

Of the questions must be such that even a below average students must be able to attempt,  
About 20% of the questions must be such that only above average students must be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.

[I hereby certify that All the questions are set as per the above guide lines. Mr. Aravinda T ]

Reviewers' Comments



K =Knowledge Level C = Comprehension Level, A = Application Level

Note: While setting all types of questions the general guideline is that about 60%

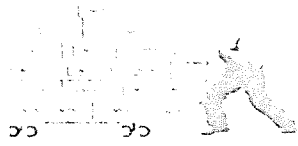

Of the questions must be such that even a below average students must be able to attempt, About 20% of the questions must be such that only above average students must be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.

[I hereby certify that All the questions are set as per the above guide lines. Mr. Aravinda T ]

Reviewers' Comments





Q No	Solution	Scheme of Marking	Max. Time required for each Question
4	<p style="text-align: center;"><b>Push vs. Pull</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Make all we can just in case.</p>  <ul style="list-style-type: none"> <li>• Production Approximation</li> <li>• Anticipated Usage's</li> <li>• Large Lots</li> <li>• High Inventories</li> <li>• Waste</li> <li>• Management by Intuition</li> <li>• Poor Communication</li> </ul> </div> <div style="text-align: center;"> <p>Make what's needed when we need it</p>  <ul style="list-style-type: none"> <li>• Production Precision</li> <li>• Actual Consumption</li> <li>• Small Lots</li> <li>• Low Inventories</li> <li>• Waste Reduction</li> <li>• Management by Sight</li> <li>• Better Communication</li> </ul> </div> </div>	<p>Sketch:2m Explanation:4M=6m</p>	6 Min
5	<ol style="list-style-type: none"> <li>1. PRE-PLANNING PHASE</li> <li>2. PLANNING PHASE</li> <li>3. CONTROL</li> </ol>	2 x3=6M	6 Min
6	<ul style="list-style-type: none"> <li>• Overproduction</li> <li>• Queues</li> <li>• Transportation</li> <li>• Inventory</li> <li>• Motion</li> <li>• Over processing</li> <li>• Defective products</li> </ul>	1 x 6=6M	6 Min

**Part C**

(Q x M = Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
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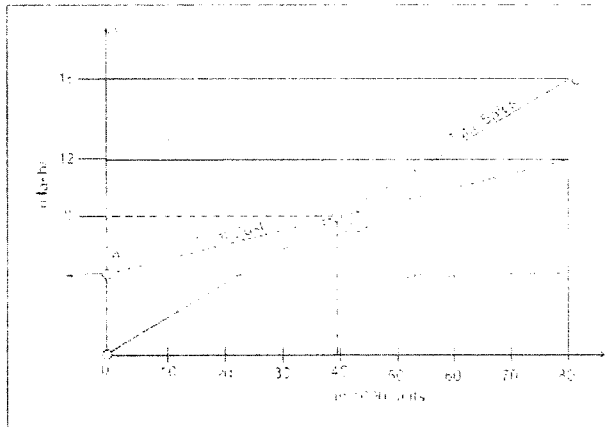
7

(a) Analytically

$$BEP = \frac{F}{S - V} = \frac{4,00,000}{20 - 10} = \frac{4,00,000}{10} = 40,000 \text{ units}$$

(b) Graphically

No. of units produced (Q)	FC	Total VC = 10 Q	Total Cost TC = FC + VC	Total Sales Rs. 20 Q	Profit Total Sales - Total cost
0	4,00,000	0	4,00,000	-	-4,00,000
40,000	4,00,000	4,00,000	8,00,000	8,00,000	0







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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST – 2**

**Sem & AY:** Odd Sem. 2019-20

**Date:** 16.11.2019

**Course Code:** MEC 304

**Time:** 11:00 AM to 12:00 PM

**Course Name:** PRODUCTION PLANNING AND CONTROL

**Max Marks:** 40

**Program & Sem:** B.Tech (MEC) & V DE

**Weightage:** 20%

**Instructions:**

- I. Scientific calculators are allowed

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each Question carries five marks. (4Qx5M=20M)**

1. Describe different dimensions of quality. (C.O.NO.2) [Knowledge]
2. Explain the various steps involved in product planning process. (C.O.NO.2) [Knowledge]
3. Briefly explain the ten commandants of value analysis. (C.O.NO.2) [Knowledge]
4. What is process planning? List the importance of it. (C.O.NO.2) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer both the Questions. Each Question carries five marks. (2Qx5M=10M)**

5. What are the quality control tools that you know? Explain how these tools are used to improve a process or product quality. (C.O.NO.2) [Comprehension]
6. Assuming that you are a process planning engineer of a manufacturing firm, list the responsibilities that you supposed to deal with. (C.O.NO.2) [Comprehension]

**Part C [Problem Solving Questions]**

**Answer the Question. The Question carry ten marks.**

**(1Qx10M=10M)**

7. A product is sold at a rate of 500 nos. per day and the same is manufactured at the rate of 3000 nos. a day. The set up cost of machines is Rs.7000 and the storage cost is estimated as Rs.0.05 per unit per day. Labour cost, material cost and over-head cost are Rs.200, Rs.120 and Rs.190 respectively. If the interest rate is 12%, find the batch size so that total cost is minimum. Also find the total cost of a production run. Assume that the production facility is in operation for 320 days in a year.

(C.O.NO.2) [Application]



# SCHOOL OF ENGINEERING

Semester: 5

Course Code: MEC304

Course Name: Production Planning and Control

Date: 16.11.2019

Time: 11 AM – 12 Noon

Max Marks: 40

Weightage: 20%

### Extract of question distribution [outcome wise & level wise]

Q.NO	C.O.NO	Unit/Module Number/Unit /Module Title	Memory recall type			Thought provoking type			Problem Solving type			Total Marks
			[Marks allotted]			[Marks allotted]			[Marks allotted]			
			Bloom's Levels			Bloom's Levels			[Marks allotted]			
			K			C			A			
1.	2	II/Toyota Production System	5									5
2.	2	III/Product Planning and Process Planning	5									5
3.	2	III/Product Planning and Process Planning	5									5
4.	2	III/Product Planning and Process Planning	5									5
5.	2	II/Toyota Production System				5						5
6.	2	III/Product Planning and Process Planning				5						5

7.	2	III/Product Planning and Process Planning							10			10
	Total Marks		20			10			10			40

K =Knowledge Level C = Comprehension Level, A = Application Level

Note: While setting all types of questions the general guideline is that about 60%

Of the questions must be such that even a below average students must be able to attempt, About 20% of the questions must be such that only above average students must be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.



## Annexure- II: Format of Answer Scheme



### SCHOOL OF ENGINEERING

#### SOLUTION

**Semester:** 5

**Course Code:** MEC304

**Course Name:** Production Planning and Control

**Date:** 16.11.2019

**Time:** 11 AM – 12 Noon

**Max Marks:** 40

**Weightage:** 20%

#### Part A

(4Q x 5M = 20 Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
1	Dimensions of quality include (a) Performance (b) Aesthetics (c) Special features (d) Conformance (e) Reliability (f) Duality (g) Perceived quality (h) Serviceability	Listing of 8 dimensions– 2 Marks Brief note on each dimension – 3 Marks	7 Min.
2	Steps in product planning process: (a) Marketing and Marketing analysis. (b) The performance of feasibility studies, and (c) Advanced planning	Flow chart of product planning – 3 Marks Explanation – 2 Marks	7 Min
3	Ten commandants of value analysis (a) Do not use a components that does not contribute to the value (b) Do not use a component whose cost is not proportionate to its usefulness (c) Do not provide any features to the component that are not necessary (d) Accept the change of quality material where the overall cost is less	Each commandant - ½ marks and for 10 Commandants Total – 5 Marks	7 Min.

	<p>(e) Use a method or process costing less.</p> <p>(f) Replace the non-standard parts with the standard part.</p> <p>(g) Use proper tooling and manufacturing methods</p> <p>(h) Cost of components shall be proportional to the material used</p> <p>(i) Use the material better suited for the purpose</p> <p>(j) If a supplier can provide a better part, then do not make it yourself.</p>		
4	<p>Process planning Definition: Act of preparing a detailed processing documentation for the manufacture of a piece part or assembly</p> <p>Importance</p> <ol style="list-style-type: none"> <li>Link between engineering design and shop floor manufacturing.</li> <li>Determines the how the products will be manufactured</li> <li>Process plans developed should be feasible, low cost and consistent.</li> <li>Feedback from shop floor to design engineering regarding the manufacturability.</li> </ol>	<p>Definition – 2 Marks Importance – 3 Marks</p>	7 Min.

**Part B**

(2Q x 5M = 10 Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
5	<p><b>7 QC tool</b></p> <ul style="list-style-type: none"> <li>• Stratification</li> <li>• Histogram</li> <li>• Check Sheet (Tally Sheet)</li> <li>• Cause-and-effect diagram</li> <li>• Pareto chart</li> <li>• Scatter diagram</li> <li>• Control chart</li> </ul>	<p>Listing 7 QC tools - 2 Marks Explanation - 3 Marks</p>	7 Min.

6	Responsibility of a process planning engineer i. Interpreting part print analysis ii. Gathering the fundamental details of product design iii. Selecting the machining process iv. Selecting proper machining with allied tooling v. Sequence of operation vi. Decide on inspection equipment vii. Determining appropriate production tolerance viii. Determine proper cutting tools and cutting conditions ix. Calculating the overall time	At least 8 responsibilities – 5 Marks	7 Min.

**Part C**

(1Q x 10M = 10 Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
7	(a) Batch size $Q_m = 2351$ units (b) Cost of production run = Rs. 12,12,998	Identification of data given – 2 Mark Formulae – 2 Marks Finding $Q_m$ – 4 Marks Calculation of cost of production run – 2 Marks	10 Min.





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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**END TERM FINAL EXAMINATION**

**Semester:** Odd Semester: 2019 - 20

**Course Code:** MEC 304

**Course Name:** PRODUCTION PLANNING AND CONTROL

**Program & Sem:** B.Tech (MEC). & 5<sup>th</sup> (DE – I)

**Date:** 20 December 2019

**Time:** 9.30 AM to 12.30 PM

**Max Marks:** 80

**Weightage:** 40%

**Instructions:**

- (i) Read the all questions carefully and answer accordingly.
- (ii) Usage of scientific calculator is allowed

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each Question carries 5 marks.**

**(4Qx5M= 20M)**

1. Fill in the blanks:

- a) Three level of PPC are Strategic planning, Tactical planning and \_\_\_\_\_.  
(C.O.No.1) [Knowledge]
- b) The process of visually displaying the things in shop floor so that everyone can understand is known as \_\_\_\_\_.  
(C.O.No.2) [Knowledge]
- c) In classes of economic value, value associated with intended function is called as \_\_\_\_\_ value.  
(C.O.No.3) [Knowledge]
- d) In production scheduling, STR stands for \_\_\_\_\_.  
(C.O.No.4) [Knowledge]
- e) Three important factors affecting inventory control are type of a product, type of manufacturing and \_\_\_\_\_.  
(C.O.No.5) [Knowledge]

2. Match the following:

(C.O.No.1) [Knowledge]

**Types of Production**

**Products**

- |                     |                       |
|---------------------|-----------------------|
| a) Job shop         | i) Cars               |
| b) Batch production | ii) Soft drinks       |
| c) Mass production  | iii) Ship building    |
| d) Flow production  | iv) Tailor made dress |
| e) Project          | v) Baking cakes       |

3. List the factors that needs to be considered in the selection of batch size.

(C.O.No.3) [Knowledge]

4. What is ABC analysis? Explain the importance of it in inventory control.(C.O.No.5) [Knowledge]

### Part B [Thought Provoking Questions]

Answer all the Questions. Each Question carries 6 marks.

(5Qx6M=30M)

5. Briefly explain about Toyota Production System (TPS) house with suitable diagram.  
(C.O.No.2) [Comprehension]
6. What are the seven quality control tools? Explain any two tools and show how it is used to improve a process or product quality.  
(C.O.No.2) [Comprehension]
7. Describe various steps in value analysis.  
(C.O.No.3) [Comprehension]
8. Explain different functions of Master Production Schedule (MPS).  
(C.O.No.4) [Comprehension]
9. Differentiate between P system and Q system in inventory control.  
(C.O.No.5) [Comprehension]

### Part C [Problem Solving Questions]

Answer all the Questions. Each Question carries 6 marks.

(5Qx6M=30M)

10. Demand for a product is 400 units per day and the same is manufactured at a rate of 2000 units per day. The setup costs of the machines are Rs.5000 and the storage costs are found to be Rs.015 per unit per day. Labor charges are Rs.120, materials Rs.80 and over heads Rs.160 per unit. If the interest rate is 13%, find the batch size so that total cost is minimum. Also find the total cost of a production run. Assume that the production facility is in operation for 300 days in a year.  
(C.O.No.3) [Application]
11. A manufacturing facility has five jobs to be scheduled on a machine. Their sequence of arrival, processing time and due-date are given in the table below.  
(C.O.No.4) [Application]

Job (in sequence of arrival)	Processing time (in days)	Due date (Date from now)
A	4	6
B	5	7
C	3	8
D	7	10
E	2	3

Schedule the jobs using FCFS, SPT and due date priority rules and compare the results.

12. Consider the following two machines and six jobs flow shop scheduling problem. Using Johnson's algorithm, obtain the optimal sequence which will minimize the makespan. Also schedule the job and find the minimum total flow time. (C.O.No.4) [Application]

Job	Machine 1	Machine 2
1	5	7
2	10	8
3	8	13
4	9	7
5	6	11
6	12	10

13. Production scheduling is to be done for four jobs which can be processed in any of the four machines. The following table shows the time of processing jobs in each machine in "hrs". Determine the final allocation of jobs in each machine so that total processing time is minimum. (C.O.No.4) [Application]

Jobs	Machines			
	M1	M2	M3	M4
J1	5	7	11	6
J2	8	5	9	6
J3	4	7	9	7
J4	10	4	8	3

14. The yearly demand for an item is 6000 units. The unit cost is Rs.200 and the inventory carrying cost is estimated as 20% per annum. If the cost of one procurement is Rs.500, determine: (C.O.No.5) [Application]

- (i) Economic order quantity
- (ii) Number of orders per year
- (iii) Time interval between two consecutive orders
- (iv) Optimal cost







## SCHOOL OF ENGINEERING

### END TERM FINAL EXAMINATION

#### Extract of question distribution [outcome wise & level wise]

Q.NO.	C.O.NO (% age of CO)	Unit/Module Number/Unit /Module Title	Memory recall type	Thought provoking type	Problem Solving type [Marks allotted]	Total Marks
			[Marks allotted] Bloom's Levels	[Marks allotted] Bloom's Levels		
			K	C	A	
<b>PART A</b> Q. NO 1	CO 1 CO 2 CO 3 CO 4 CO 5	All the 5 modules	5 (1+1+1+1+1)			5
<b>PART A</b> Q. NO 2	CO 1	MODULE 1 Introduction	5			5
<b>PART A</b> Q. NO 3	CO 3	MODULE 3 Product Planning and Process Planning	5			5
<b>PART A</b> Q. NO 4	CO 5	MODULE 5 Inventory Control And Recent Trends In PPC	5			5
<b>PART B</b> Q. NO 5	CO 2	MODULE 2 Toyota Production System		6		6
<b>PART B</b> Q. NO 6	CO 2	MODULE 2 Toyota Production System		6		6
<b>PART B</b>	CO 3	MODULE 3		6		6

Q. NO 7		Product Planning and Process Planning				
<b>PART B</b> Q. NO 8	CO 4	MODULE 4 Production Scheduling		6		6
<b>PART B</b> Q. NO 9	CO 5	MODULE 5 Inventory Control And Recent Trends In PPC		6		6
<b>PART C</b> Q. NO 10	CO 3	MODULE 3 Product Planning and Process Planning			6	6
<b>PART C</b> Q. NO 11	CO 4	MODULE 4 Production Scheduling			6	6
<b>PART C</b> Q. NO 12	CO 4	MODULE 4 Production Scheduling			6	6
<b>PART C</b> Q. NO 13	CO 4	MODULE 4 Production Scheduling			6	6
<b>PART C</b> Q. NO 14	CO 5	MODULE 5 Inventory Control And Recent Trends In PPC			6	6
	Total Marks		20	30	30	80

K =Knowledge Level C = Comprehension Level, A = Application Level

C.O WISE MARKS DISTRIBUTION:

CO 1: 6 MARKS, CO 2: 13 MARKS, CO 3: 18 MARKS, CO 4: 25 MARKS,

CO 5:18 MARKS

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Of the questions must be such that even a below average students must be able to attempt, About 20% of the questions must be such that only above average students must be able to attempt and finally 20% of the questions must be such that only the bright students must be able to attempt.

I hereby certify that all the questions are set as per the above guidelines.

Faculty Signature:

Reviewer Commend:

## Format of Answer Scheme



### SCHOOL OF ENGINEERING

#### SOLUTION

Semester: Odd Semester: 2019 - 20

Course Code: MEC 304

Course Name: Production Planning and Control

Program & Sem: Mechanical Engg. & 5<sup>th</sup> Sem

Date: 20 Dec 2019

Time: 3 Hrs.

Max Marks: 80

Weightage: 40%

#### Part A

(4Q x 5M = 20Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
1	<ul style="list-style-type: none"> <li>a) Operational planning</li> <li>b) Visual communication</li> <li>c) Use</li> <li>d) Slack Time Remaining</li> <li>e) Volume of Production</li> </ul>	(Each 1 Mark) 1x5 = 5 Marks	5 Min
2	<ul style="list-style-type: none"> <li>a) Job shop</li> <li>b) Batch production</li> <li>c) Mass production</li> <li>d) Flow production</li> <li>e) Project</li> <li>(iv) Tailor made dress</li> <li>(v) Baking cakes</li> <li>(i) Cars</li> <li>(ii) Soft drinks</li> <li>(iii) Ship building</li> </ul>	(Each 1 Mark) 1x5 = 5 Marks	5 Min
3	<ul style="list-style-type: none"> <li>• Setup cost of machines and other costs of preparation for the run</li> <li>• Consumption rate</li> <li>• Production rate</li> <li>• Interest charges per piece per unit time.</li> <li>• Average storage costs</li> <li>• Sales price unit</li> </ul>	Atleast 5 Factors (Each 1 Mark) 1x5 = 5 Marks	10 Min
4	ABC Analysis: <ul style="list-style-type: none"> <li>• This technique divides inventory into three categories A, B &amp; C based on their annual consumption value.</li> <li>• It is also known as Selective Inventory Control Method (SIM)</li> </ul> Importance: <ul style="list-style-type: none"> <li>• It ensures better control over the costly items in which a large amount of capital is invested</li> <li>• It helps in developing scientific method of controlling inventories</li> <li>• It ensures considerable reduction in the storage cost</li> <li>• It helps in maintaining enough safety stock for C category of items</li> </ul>	ABC Analysis - 2 Marks  Importance – 3 Marks	10 Min

Part B

(5Q x 6M = 30 Marks)

Q No	Solution	Scheme of Marking	Max. Time required for each Question
5	<p>The diagram is a house-shaped structure. At the top is a triangle. Below it is a horizontal bar containing the text: "Goal: Highest Quality, Lowest Cost, Shortest Lead Time". Below this bar are two vertical pillars. The left pillar is labeled "Just in Time" and contains the text: "Continuous Flow", "Takt Time", and "Pull System". The right pillar is labeled "Jidoka" and contains the text: "Stop and notify of abnormalities" and "Separate man's work &amp; machine's work". Below these pillars are three horizontal bars: "Heijunka", "Standardized Work", and "Kaizen". At the very bottom is a shaded horizontal bar.</p>	<p>TPS house Diagram – 3 Marks</p> <p>Explanation – 3 Marks</p>	15 Min
6	<p><b>7 QC tool</b></p> <ul style="list-style-type: none"> <li>• Stratification</li> <li>• Histogram</li> <li>• Check Sheet (Tally Sheet)</li> <li>• Cause-and-effect diagram</li> <li>• Pareto chart</li> <li>• Scatter diagram</li> <li>• Control chart</li> </ul>	<ul style="list-style-type: none"> <li>• Listing 7 QC tools - 2 Marks</li> <li>• Explanation - 4 Marks (2 each)</li> </ul>	15 Min
7	<p><b>Blast</b>          Identify the product          Collect relevant information          Define different functions</p> <p><b>Create</b>          Create different alternatives          Critically evaluate the alternatives</p> <p><b>Refine</b>          Develop the best alternative          Implement the alternative</p>	<p>Each step 2 Marks          2x3=6 Marks</p>	10 Min
8	<p><b>Functions of MPS</b></p> <ul style="list-style-type: none"> <li>▪ To translate into aggregate plans into specified end items</li> <li>▪ To evaluate alternate schedule</li> <li>▪ To generate material Requirement</li> <li>▪ To generate facility requirement</li> <li>▪ To facilitate information processing</li> <li>▪ To maintain valid priorities</li> <li>▪ To utilize capacity effectively</li> </ul>	<p>At least six functions –1 Mark each          1x6 = 6 Marks</p>	10 Min

9	P System	Q System	At least six difference –1 Mark each 1x6 = 6 Marks	10 Min
	Order quantity varies	Constant		
	Ordered when time When reaches re-order level	When period reached		
	Larger than Q model	Less than P model		
	Maintenance time is less	More		
	Suitable for high cost, less no. of items.	Suitable for low cost, high volume items.		
	Counting of items at the end of the period	Record maintained every time there is a change		

**Part C**

(5Q x 6M = 30Marks)

Q No	Solution					Scheme of Marking	Max. Time required for each Question
10	(a) Batch size $Q_m = 4292$ units (b) Cost of production run = Rs. 15,55,120					Identification of data given – 1 Mark Formulae – 1 Mark Finding $Q_m$ – 2Marks Calculation of cost of production run – 2 Marks	15 Min.
11	S.No	Rule	Total Completion time (days)	Average Completion time (days)	Average lateness (days)	Scheduling by each rule – 2 Marks 2x3 =6 Marks	15 Min
	1	FCFS	65	13	6.6		
	2	SPT	51	10.2	4.2		
	3	DD	51	10.2	3.6		
12	Optimal Sequence is: 1-5-3-6-2-4 Minimum total flow time is 61 Hrs.					Finding Optimal Sequence – 2 Marks Minimum total flow time – 4 Marks	15 Min.
13	Assignment: $J_1 \rightarrow M_1, J_2 \rightarrow M_2, J_3 \rightarrow M_3, J_4 \rightarrow M_4$ Total Processing Time = 22 Hrs.					Finding Assignment – 5 Marks Total Processing Time – 1 Mark	15 Min.
14	EOQ = 387 units N = 16 Orders T = 0.75 Month = 23 days Cost = Rs.240,000,000					Finding EOQ – 2 Marks N & T – 2 Marks Cost – 2 Marks	15 Min