Name:

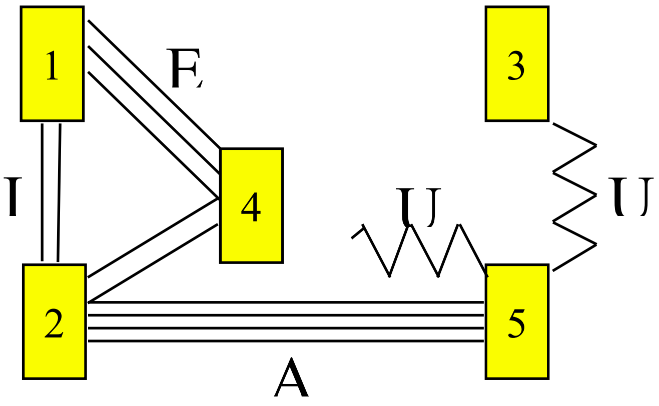
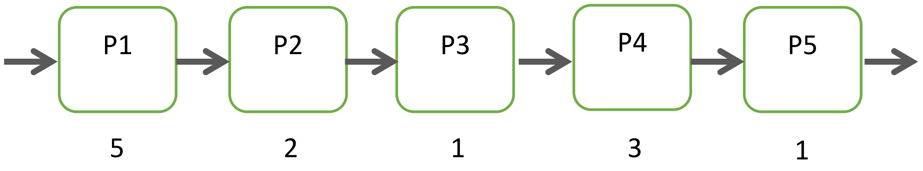
Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2019

Course: Operations Management **Semester:** II
Program: MBA (BA) **Time:** 03 Hours
Course code: LSCM 7001 **Max. Marks:** 100
Instructions: Do as directed in the questions of respective sections.

SECTION A [20 Marks]

		Marks	CO
Q 1	Answer all the ten objective questions.		
(i)	TQM stands for ________________________________. [fill in the blank]	[2]	4
(ii)	ERP stands for ________________________________. [fill in the blank]	[2]	1
(iii)	Chase strategy and Level strategy are adopted in __________. [select the right answer] Aggregate planning / Facility planning / Materials planning	[2]	2
(iv)	Based on the given initial relationship diagram (below), develop a final layout for the facilities of a hospital.  	[2]	2
(v)	In the following process map, the five boxes indicate the 5-stages of a production system. Respective processing times (in minutes) are mentioned below the boxes.  What is the flow time of this production system?	[2]	1

<table>
<tr><td>(vi)</td><td>______________________ is a technique used for a short-range forecasting that constructs a new forecast for the next period with the help of last period’s actual and forecast values. [fill in the blank]</td><td>[2]</td><td>3</td></tr>
<tr><td>(vii)</td><td>A layout that typically recommends the use of specialized machines is a ________________. [fill in the blank]
Product layout / Process layout / Hybrid layout / Fixed position layout</td><td>[2]</td><td>2</td></tr>
<tr><td>(viii)</td><td>Write a mathematical expression for ‘value’ and mention the terms used therein.</td><td>[2]</td><td>1</td></tr>
<tr><td>(ix)</td><td>Write the equation for EOQ and specify the components of it.</td><td>[2]</td><td>4</td></tr>
<tr><td>(x)</td><td>During a particular week, the production of a plant was 80 units. If, its historic highest or best utilization recorded was 120 units per week. What is this plant’s capacity utilization in the given week?</td><td>[2]</td><td>1</td></tr>
<tr><td colspan="4">SECTION B [20 Marks]</td></tr>
<tr><td>Q 2</td><td>Answer any <u>four</u> of the following short questions.</td><td></td><td></td></tr>
<tr><td>(i)</td><td>Write a short note on “Quality Control”.</td><td>[5]</td><td>4</td></tr>
<tr><td>(ii)</td><td>Write a short note on “Stores Management”.</td><td>[5]</td><td>4</td></tr>
<tr><td>(iii)</td><td>Write a short note on “Bill of Materials (BOM)”</td><td>[5]</td><td>4</td></tr>
<tr><td>(iv)</td><td>Delta Inc. has been experiencing imbalances in its inventory of components used in the production of computer printers. Both stock shortages and overstocks are occurring. The production analysis group studied the demand pattern of a component PS24 used in the products. The group wanted to do the material forecasting for all components including PS24. The group of analysts believes that the most recent data for 12 weeks as the true representative for future weekly demand study.
<table>
<tr><td>Weeks</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td>Demand</td><td>159</td><td>217</td><td>186</td><td>161</td><td>173</td><td>157</td><td>203</td><td>195</td><td>188</td><td>168</td><td>198</td><td>159</td></tr>
</table>
Use the 4-week moving average method to develop a forecast of the component PS24 for the 13th week.</td><td>[5]</td><td>3</td></tr>
<tr><td>(v)</td><td>Explain the suitability of various production systems with respect to the volume of production and variety of products.</td><td>[5]</td><td>1</td></tr>
</table>

(vi) Find the optimal sequence and makespan for 4 jobs to be processed on 4-machines by following CDS heuristic to a multistage Johnson's rule based problem, as per the data given below.

Jobs	Processing time		
	Machine-1	Machine-2	Machine-3
A	2	3	7
B	3	7	3
C	1	2	4
D	3	4	3

[5] 2

SECTION-C [30 Marks]

Q 3 Answer any three of the following long question.

(i) Write a short note on 'Inventory Control'. Draw the graph to explain the concept of EOQ and Derive an equation for calculating the EOQ.

[10] 4

(ii) Consider the data given in the precedence table below for a production unit. As an operation manager of the production unit, explain how will be able to enhance the efficiency by using the line balancing technique while executing an order having the cycle time of 20 hours?

ACTIVITY	**DURATION (Hrs.)**	**PREDECESSOR(S)**
A	8	None
B	4	A
C	12	None
D	5	A, C
E	2	D
F	4	E
G	4	B
H	6	F, G

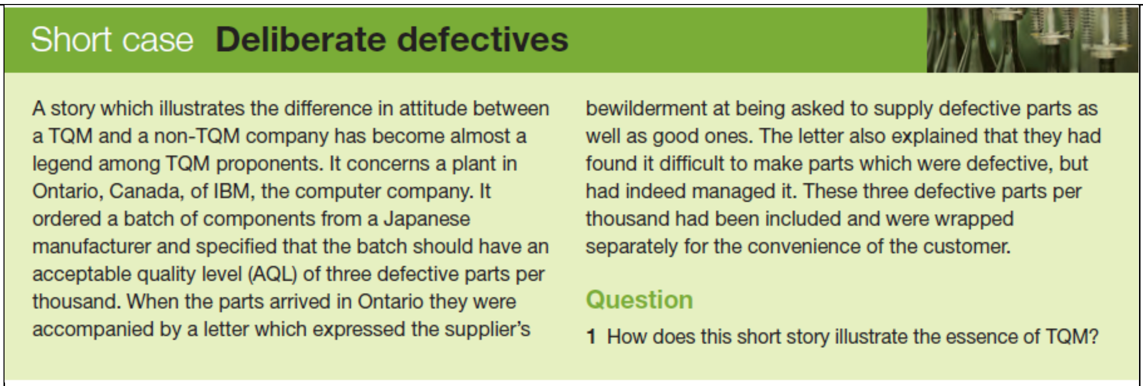
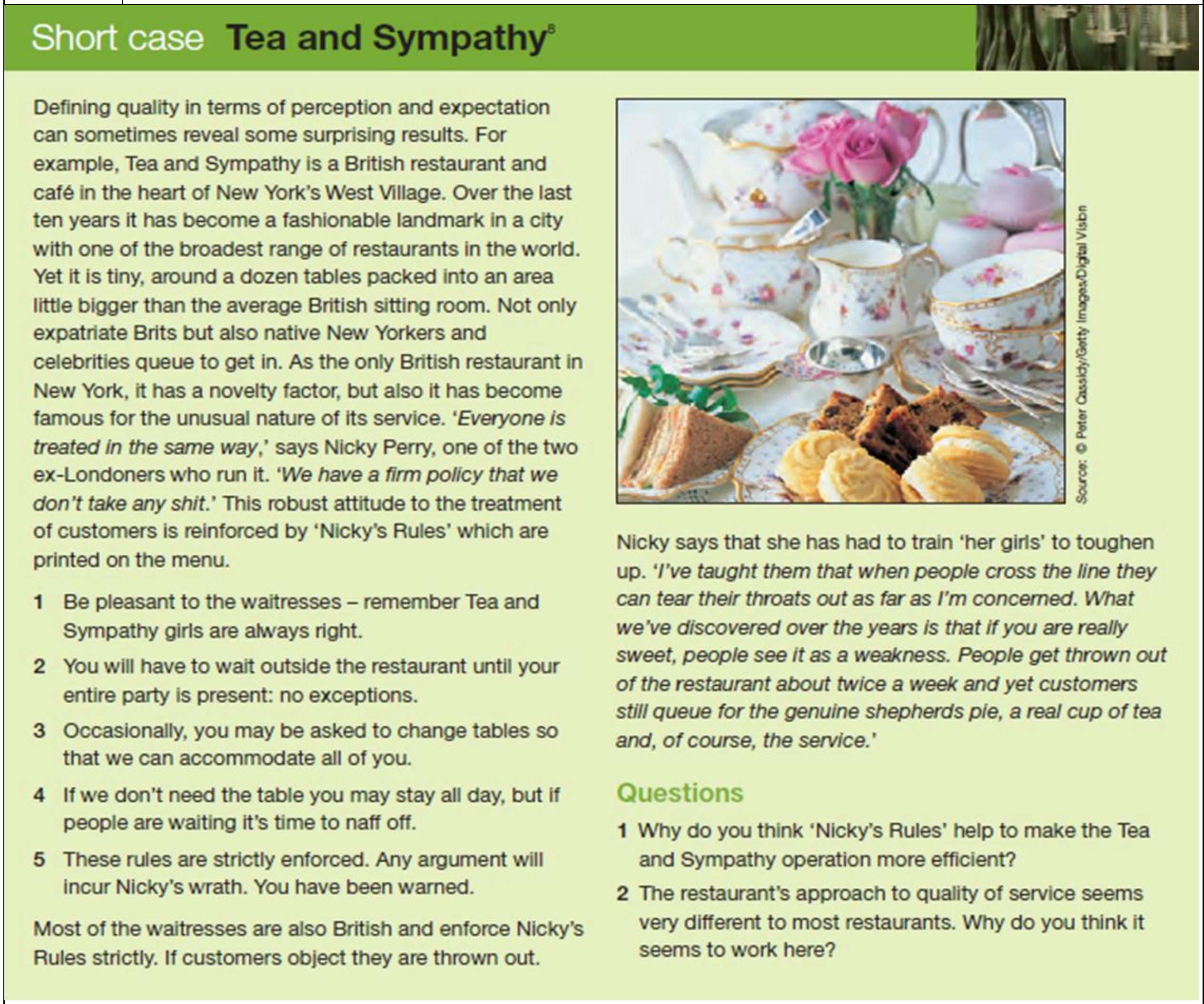
[10] 2

(iii) Describe different types of production and their suitable layouts.

[10] 1

(iv) List and explain the 10 R's (right practices) of purchasing with reference to an industrial example.

[10] 4

(v)	 **Short case Deliberate defectives** A story which illustrates the difference in attitude between a TQM and a non-TQM company has become almost a legend among TQM proponents. It concerns a plant in Ontario, Canada, of IBM, the computer company. It ordered a batch of components from a Japanese manufacturer and specified that the batch should have an acceptable quality level (AQL) of three defective parts per thousand. When the parts arrived in Ontario they were accompanied by a letter which expressed the supplier's bewilderment at being asked to supply defective parts as well as good ones. The letter also explained that they had found it difficult to make parts which were defective, but had indeed managed it. These three defective parts per thousand had been included and were wrapped separately for the convenience of the customer. **Question** 1 How does this short story illustrate the essence of TQM? [Source: Nigel Slack, Stuart Chambers and Robert Johnston, *Operations Management, Ed. 2007,* Fifth Edition, Pearson Education Limited, *Ch-20: Managing improvement – the TQM approach*, p.659.]	[10]	4
SECTION-D [30 Marks]			
Q 4	Answer the question related to the CASE after thorough reading and analysis.		
 **Short case Tea and Sympathy**[8] Defining quality in terms of perception and expectation can sometimes reveal some surprising results. For example, Tea and Sympathy is a British restaurant and café in the heart of New York's West Village. Over the last ten years it has become a fashionable landmark in a city with one of the broadest range of restaurants in the world. Yet it is tiny, around a dozen tables packed into an area little bigger than the average British sitting room. Not only expatriate Brits but also native New Yorkers and celebrities queue to get in. As the only British restaurant in New York, it has a novelty factor, but also it has become famous for the unusual nature of its service. '*Everyone is treated in the same way*,' says Nicky Perry, one of the two ex-Londoners who run it. '*We have a firm policy that we don't take any shit*.' This robust attitude to the treatment of customers is reinforced by 'Nicky's Rules' which are printed on the menu. 1 Be pleasant to the waitresses – remember Tea and Sympathy girls are always right. 2 You will have to wait outside the restaurant until your entire party is present: no exceptions. 3 Occasionally, you may be asked to change tables so that we can accommodate all of you. 4 If we don't need the table you may stay all day, but if people are waiting it's time to naff off. 5 These rules are strictly enforced. Any argument will incur Nicky's wrath. You have been warned. Most of the waitresses are also British and enforce Nicky's Rules strictly. If customers object they are thrown out. Source: © Peter Cassidy/Getty Images/Digital Vision Nicky says that she has had to train 'her girls' to toughen up. '*I've taught them that when people cross the line they can tear their throats out as far as I'm concerned. What we've discovered over the years is that if you are really sweet, people see it as a weakness. People get thrown out of the restaurant about twice a week and yet customers still queue for the genuine shepherds pie, a real cup of tea and, of course, the service.*' **Questions** 1 Why do you think 'Nicky's Rules' help to make the Tea and Sympathy operation more efficient? 2 The restaurant's approach to quality of service seems very different to most restaurants. Why do you think it seems to work here? [Source: Nigel Slack, Stuart Chambers and Robert Johnston, *Operations Management, Ed. 2007,* Fifth Edition, Pearson Education Limited, p. 541.]		[15] [15]	1, 4

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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

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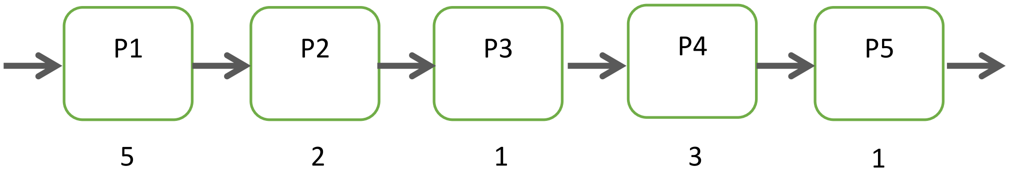
SECTION A [20 Marks]

<table>
<tr><th></th><th></th><th>Marks</th><th>CO</th></tr>
<tr><td>Q 1</td><td>Answer all the <u>ten</u> objective questions.</td><td></td><td></td></tr>
<tr><td>(i)</td><td>JIT stands for ______________________________. [fill in the blank]</td><td>[2]</td><td>2</td></tr>
<tr><td>(ii)</td><td>MRP stands for _________________________________. [fill in the blank]</td><td>[2]</td><td>3</td></tr>
<tr><td>(iii)</td><td>Which type of layout is likely to have more in-process inventory? [select the right answer] Job shop layout / Functional layout / Line layout / Fixed position layout</td><td>[2]</td><td>2</td></tr>
<tr><td>(iv)</td><td>The table below indicates the demand for three weeks. Forecast the demand for the fourth week, using ‘simple moving average’ method.
<table>
<tr><td>Week</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Demand</td><td>500</td><td>600</td><td>650</td></tr>
</table></td><td>[2]</td><td>3</td></tr>
<tr><td>(v)</td><td>In the following process map, the five boxes indicate the 5-stages of a production system. Respective processing times (in minutes) are mentioned below the boxes.


What is the cycle time of this production system?</td><td>[2]</td><td>1</td></tr>
<tr><td>(vi)</td><td>_____________ type of layout is designed to accommodate processing one or a few variety of related products. [fill in the blank]</td><td>[2]</td><td>2</td></tr>
<tr><td>(vii)</td><td>Process layout is also known as ____________. [fill in the blank with right answer] Group layout / Combined layout / Functional layout / Line layout</td><td>[2]</td><td>2</td></tr>
<tr><td>(viii)</td><td>The ‘customer lead time’ for a business houses is larger in______________________ type. [select the right answer]
Make-to-stock / Make-to-order</td><td>[2]</td><td>1</td></tr>
<tr><td>(ix)</td><td>The listing of quantities of all raw materials, parts, sub-assemblies, and assemblies that go into an end item is a ___________. [Fill in the blank]</td><td>[2]</td><td></td></tr>
<tr><td>(x)</td><td>CRAFT is a computerized technique for _______. [select the right alternative.]
layout planning/location planning/ capacity planning/ forecasting</td><td>[2]</td><td>2</td></tr>
</table>

<table>
<tr><td colspan="4">SECTION B [20 Marks]</td></tr>
<tr><td>Q 2</td><td>Answer any <u>four</u> of the following short questions.</td><td></td><td></td></tr>
<tr><td>(i)</td><td>Write a short note on “Quality Circle”.</td><td>[5]</td><td>4</td></tr>
<tr><td>(ii)</td><td>What are the standard operating procedures (SOP) of stores? List and explain in short.</td><td>[5]</td><td>4</td></tr>
<tr><td>(iii)</td><td>Write a short note on “Bill of Materials (BOM)”.</td><td>[5]</td><td>4</td></tr>
<tr><td>(iv)</td><td>Delta Inc. has been experiencing imbalances in its inventory of components used in the production of computer printers. Both stock shortages and overstocks are occurring. The production analysis group studied the demand pattern of a component PS24 used in the products. The group wanted to do the material forecasting for all components including PS24. The group of analysts believes that the most recent data for 12 weeks as the true representative for future weekly demand study.
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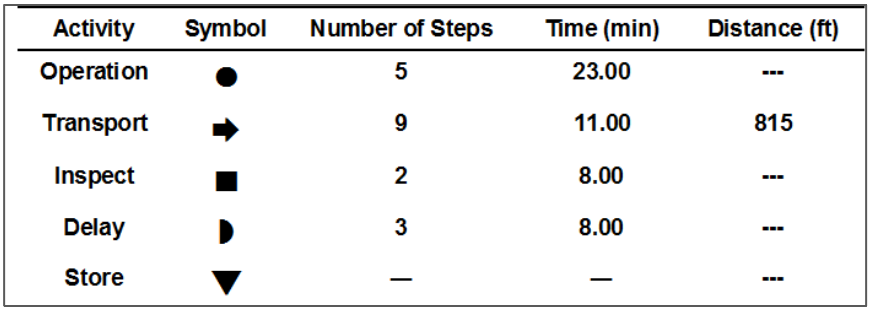
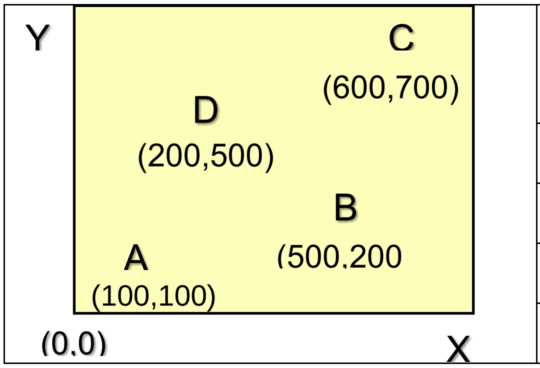
</table>
Use the 4-week weighted moving average method and weights 0.4 (most recent), 0.3, 0.2 and 0.1 to forecast the demand of PS24 in the 13th week.</td><td>[5]</td><td>3</td></tr>
<tr><td>(v)</td><td>List and explain different factors considered while selecting a plant location.</td><td>[5]</td><td>1</td></tr>
<tr><td>(vi)</td><td>An analyst for a manufacturing process prepares following data summary sheet. What is your interpretation and suggestion as a budding professional ‘Business Analyst?

<table>
<tr><th>Activity</th><th>Symbol</th><th>Number of Steps</th><th>Time (min)</th><th>Distance (ft)</th></tr>
<tr><td>Operation</td><td>●</td><td>5</td><td>23.00</td><td>---</td></tr>
<tr><td>Transport</td><td>➡</td><td>9</td><td>11.00</td><td>815</td></tr>
<tr><td>Inspect</td><td>■</td><td>2</td><td>8.00</td><td>---</td></tr>
<tr><td>Delay</td><td>◗</td><td>3</td><td>8.00</td><td>---</td></tr>
<tr><td>Store</td><td>▼</td><td>—</td><td>—</td><td>---</td></tr>
</table></td><td>[5]</td><td>1</td></tr>
<tr><td colspan="4">SECTION-C [30 Marks]</td></tr>
<tr><td>Q 3</td><td>Answer any <u>three</u> of the following long question.</td><td></td><td></td></tr>
<tr><td>(i)</td><td>Write a short note on 'Inventory Control'. Draw the graph to explain the concept of EOQ and Derive an equation for calculating the EOQ.</td><td>[10]</td><td>4</td></tr>
</table>

(ii) A company doing its business based on e-commerce and digital marketing. Its warehouse needs to remain connected dynamically with all the distribution centers and delivery points. Therefore, identify a most suitable location from the site map for the warehouse using centroid method. The distance and load factors may be considered with reference to the two dimensional site map and the transaction details given in the table.

[10]

2



Distribution /Delivery Points	Frequency of Transactions
A	1100
B	1200
C	1300
D	1400

(iii) The time to perform each task and the tasks that must precede are:

[10]

2, 3

Task	A	B	C	D	E	F	G	H	I
Immediately preceding tasks	---	A	B	B	B	B	C,D,E	G,F	H
Task performance time (minutes)	0.15	0.06	0.05	0.12	0.09	0.16	0.08	0.06	0.05

If 300 products are needed per hour and 50 minutes per hour are productive –

a. Draw a diagram showing the precedence relationships of the tasks.
b. Compute the cycle time per unit (in minutes).
c. Compute the minimum number of workstations required.
d. Balance the production line by using longest-task-time heuristic.
e. Evaluate your proposed solution.

(iv) Find the optimal sequence and makespan for 4 jobs to be processed on 4-machines by following CDS heuristic to a multistage Johnson's rule based problem, as per the data given below.

[10]

3

Jobs	Processing time		
	Machine-1	Machine-2	Machine-3
A	3	2	7
B	7	3	3
C	2	1	4
D	4	3	3

(v) Answer both parts [10]

a) Write the mathematical expressions for calculating the standard time and its elements. An automobile service center takes 12 vehicles sequentially in hand on an average day. The average testing and maintenance servicing time per vehicle is 30 minutes. If, one hour personal allowance is given on an average 8 hours-day. Calculate the % of process allowance adopted in the organization.

b) Three production processes- P1, P2 and P3 have the following cost structure (see table). Which is the most economical process for a production volume of 8,000 units?

Process	Fixed Cost per year (in $)	Variable cost per unit (in $)
P1	120,000	3.00
P2	90,000	4.00
P3	80,000	4.50

3, 1

SECTION-D [30 Marks]

Q 4 Answer the question related to the CASE after thorough reading and analysis.

A company manufactures seasonal products. The information regarding the seasonal demand pattern, available production capacities during regular time, overtime and other details are as follows:

	Available Production Capacity (units)			
Period	RT	OT	SC	Demand Forecast
1	900	350	600	700
2	1000	350	600	1000
3	1100	350	600	2000
4	700	350	600	1200

Other relevant data can be summarized as following:

Initial inventory = 200 units; Final inventory = 25 units; Regular time prodn. cost/ unit = Rs.125/-; Over time prodn. cost/unit = Rs.150/-; Subcontracting cost/unit = Rs.175/-; Inventory Carrying cost/unit/period = Rs.25/-

Develop an aggregate capacity plan. [20]

Also calculate the optimal production cost. [10]

[Mention the assumptions, if taken anywhere]

1, 3