

I

Part Time Masters Course
Production Management Examination

SECTION 1 – 1.5 hours – 50 Marks

- Note
1. All 3 questions are compulsory. Q2 and Q3, each have an option
 2. Make valid assumptions wherever necessary. State them clearly.

Q1. Attempt any 3 15 Marks

1. Explain in brief SPT (shortest processing time) and EDD (earliest due date) with the same Single machine 5 job problem.
- ✓ 2. What are the key criteria while deciding plant location?
3. Explain P (Periodic review) system. Why is P system preferred over Q system for C class items?
- ✓ 4. Compare Product Layout and Process Layout
5. What should one look for when analyzing X and R chart for process control?
- ✓ 6. Explain briefly 7 Simple QC tools

Q2. 15 Marks

M/s Sagar Stationery specializes in doing photocopy jobs. On a Sunday afternoon, Mr. Sagar has to finish 8 pending jobs. Each job involves photocopying, and making sets. Sagar's assistant does photocopying while Sagar takes care of making sets. For these 8 jobs, determine the sequence that will enable Sagar to complete all the jobs at earliest. Also find the total make-span.

Job	1	2	3	4	5	6	7	8
Photocopying Time (min)	3	2	8	7	4	9	5	10
Set-Making Time (min)	6	5	2	4	8	3	1	7

OR

Q2. Attempt any 3 15 Marks

1. Explain the reasons why organizations carry inventory. Explain the concept of dependent demand used in MRP with a simple example.
2. Explain Aggregate planning process.
3. Write a short note on Value Analysis
4. Write a short note on differences between Kaizen and BPR
- ✓ 5. Explain EOQ model and elaborate on its limitations and uses

6. Write a short note on Strategic capacity planning, explain in terms of future uncertainty, decision horizon, breakeven analysis, economies of scale, etc

Q3. ✓

20 Marks

- For a project, the duration (in weeks) for each activity is as given below.
 A) Find the total project duration using 'Forward Pass' & 'Backward Pass'
 B) Find the critical activities
 C) If the project needs to be completed one week earlier than the normal duration, which activity would you recommend to crash? (please note that activity F cannot be crashed)

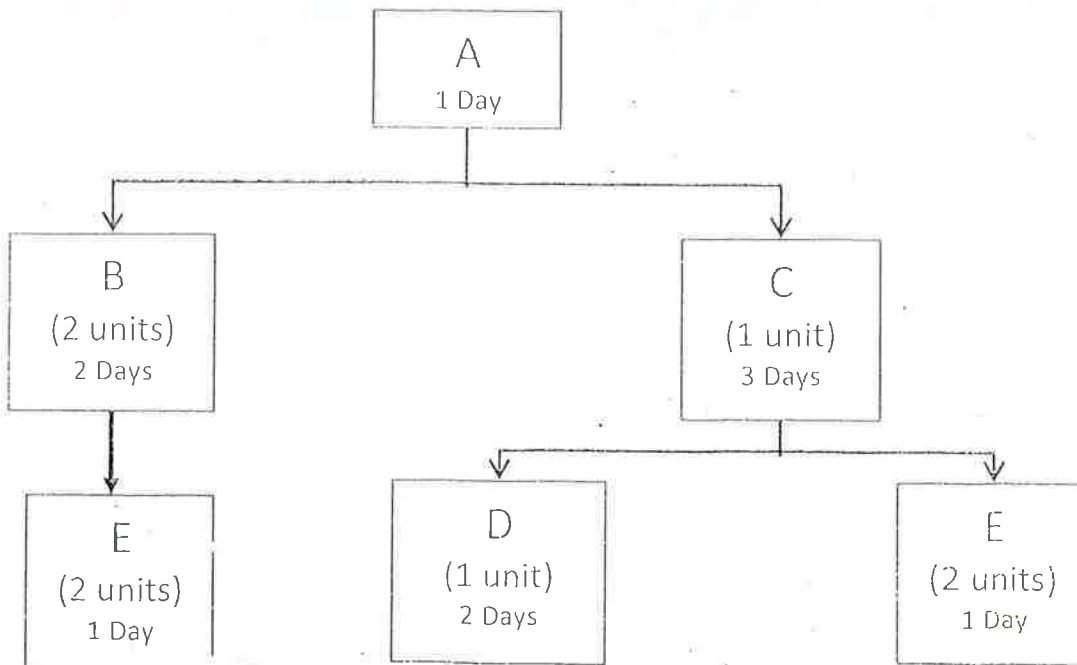
Activity	Immediate Predecessor	Duration	Incremental Cost of Crashing per week (Rs.)
A	=	8	3000
B		6	2000
C	B	8	2500
D	A	19	4000
E	B	12	1000
F	C	9	Not Possible
G	A	11	1500
H	E,F,G	7	3000
I	C	9	2000

OR

Q3.

20 Marks

For a product 'A', the BOM is as shown below. Figures in bracket indicate number of units required to make one unit of parent product. Figure below indicates the purchase/mfg lead time for the item.



Also given below is the demand for 'A' and the stocks of all items. Using MRP, work out the POR (Planned Order Release) for each item

Orders for 'A'

Day	1	2	3	4	5	6	7
Demand	8	3	2	6	7	8	5

Stock Position

Item	A	B	C	D	E
Stock	10	20	13	12	30

Sample MRP table template

A

Day	0	1	2	3	4	5	6	7
GR	0	8	3	2	6	7	8	5
Opening Stock	10							
NR								
POR								

PRODUCTION MANAGEMENT EXAM

SECTION II

- Notes: 1. Attempt any three questions.
2. Make valid assumptions wherever necessary. State them clearly.
3. Be brief. Evaluation will be based on conceptual clarity.

✓ Q1. One of the key issues in Service Organisations for Low Degree of Interaction and Customisation service providers is:
Managing demand to avoid peaks and to promote off peaks – Revenue Management

Prepare a brief note on this issue with illustrative examples

Q2. Reference the dice and match-stick game which was played during your lecture sessions on Variability Analysis, explain the process adopted and the outcome. Explain the learnings which accrued through this game.

✓ Q3. "See this machine here is only about 2 years old. Before we installed it we used other machines to do what it does. But this machine can do all the operations that used to take three different machines" says Bob.

He tells me how they used to process these parts using the three separate machines. The process time per part were, 2 minutes on the first machine, 8 minutes on the second machine and 4 minutes on the third – a grand total of 16 minutes per part. But the new NCX-10 machine can do all the three processes in 7 minutes per part.

footnote = 14 minutes per part.

"With the old way we had more machines" he says. "We had 4 of the first type, 8 of the second type and 6 of the third type. Each of the machines had to have a machinist to run it. The NCX-10 only needs 2."

Is Bob moving the company towards its "GOAL"? What should be the optimum decision for Bob's company?

✓ Q4. You were requested to study a catalogue of any consumer durable (other than mobile phone or laptop or car or bike). Enumerate five preventive maintenance points

fudge

$$\frac{60}{7} \times 8$$

Q5 The past sales performance and the future expectations of sales of a glass and chemicals manufacturer are given below:

Year	Sales
2005	12,998 units
2006	14,202 units
2007	14,481 units
2008	14,814 units
2009	17,255 units
2010	18,837 units
2011	19,408 units
2012	21,133 units
2013	25,000 units expected
2014	37,000 units forecasted
2015	41,000 units forecasted
2016	43,000 units forecasted
2017	44,000 units forecasted
2018	45,000 units forecasted
2019	45,000 units forecasted

The Central Government had reduced excise duty from 40 % to 32 % in 2005 and has further reduced the duty to 16 % in 2009. Industry sources believe that the duty may be rationalized at 8 % soon.

The current capacity is 27,000 units if plant is operated on three-shifts basis (18,000 units on two shifts basis). The management policy is to run the plant on two-shifts only, the third shift is reserved for maintenance and any other exigencies. Hence, you can notice that the operations have been carried out to a small degree in the third shift in 2010 and 2011, and a substantial degree in 2012. Workmen have been given overtime, temporary workmen have been employed, delivery lead times have been stretched and maintenance has been compromised to meet the sales demand. The matter of fact is that sales team requires 30,000 units in 2013, but this demand cannot be satisfied, and hence the management has budgeted 25,000 units.

The plant has three parallel lines of nearly equal capacities. Line 1 with a capacity of 3,600 units was installed in 1975; Line 2 having a capacity of 5,400 units was installed in 1980 and a modern Line 3 (consisting of faster, bigger equipments) having a capacity of 18,000 units was installed in 2004. All the above-mentioned capacities are on three shifts basis.

Currently, manufacturing lines with capacity of 40,000 units (on three shifts basis) are available and exhibit considerable reduction (nearly 35 % less than the current levels) in the operating expenses per unit. Older technology lines (3,600, 5400 and 18,000 capacity) are available too at lower fixed assets value, but operating expenses would be at current levels.

The management wishes to expand capacity since the demand over the last three years have demonstrated the strength of the company's brand and the operations resources have been strained for more than a year.

If machines and equipment are ordered now, they will be available by mid 2014 for normal production.

You are now in December 2013 taking a decision. Prepare a proposal recommending the capacity decision with the rationale. (You may decide to discard the old lines too.)

JAMNALAL BAJAJ INSTITUTE OF MANAGEMENT
MFM MMM II Semester II
Production Management

M Marks 50

5TH May 2012

SECTION 1 - 1.5 hours

- Note: 1. All the questions are compulsory.
 2. Make valid assumptions wherever necessary. State them clearly

Q1. Attempt any 3

15 Marks

1. Differentiate between P System (Periodic Review) and Q system (Continuous review) and explain where each may be used.
2. What are the key parameters to be considered while deciding the location for a plant.
3. Explain what are Product and Process layouts. Give 2 examples where one might be more suitable than the other.
4. Write a short note on PDCA cycle
5. Explain the 5 symbols used in process chart

Q2.

15 Marks

M/s Sagar Stationery specializes in doing photocopy jobs. On a Sunday afternoon, Mr. Sagar has to finish 10 pending jobs before can go for a date. Each job involves photocopying, and making sets. Sagar's assistant does photocopying while Sagar takes care of making sets. For these 10 jobs, determine the sequence that will enable Sagar to complete all the jobs at earliest.

Job	1	2	3	4	5	6	7	8	9	10
Photocopy	5	9	5	7	3	7	2	8	6	9
Set-Making	10	6	8	4	6	9	5	10	4	7

Q3.

20 Marks

For a project, the normal and crash durations (in weeks) for each activity are as given below. Find the total project duration using 'Forward Pass & Backward Pass'. If the project is to be completed within 40 Wks, which activities do you recommend for crashing and why?

Activity	Immediate Predecessor	Normal Duration	Normal Cost	Crash Duration	Crash Cost
A	-	6	9,000	5	11,000
B	-	7	6,000	6	9,000
C	B	4	7,000	3	8,000
D	A	12	13,000	12	13,000
E	B	12	9,000	11	11,500
F	C	9	7,000	8	8,500
G	D,E	4	11,000	4	11,000
H	E,F	10	8,000	9	9,000
I	G	10	5,000	9	7,000
J	H,I	9	14,000	8	13,000

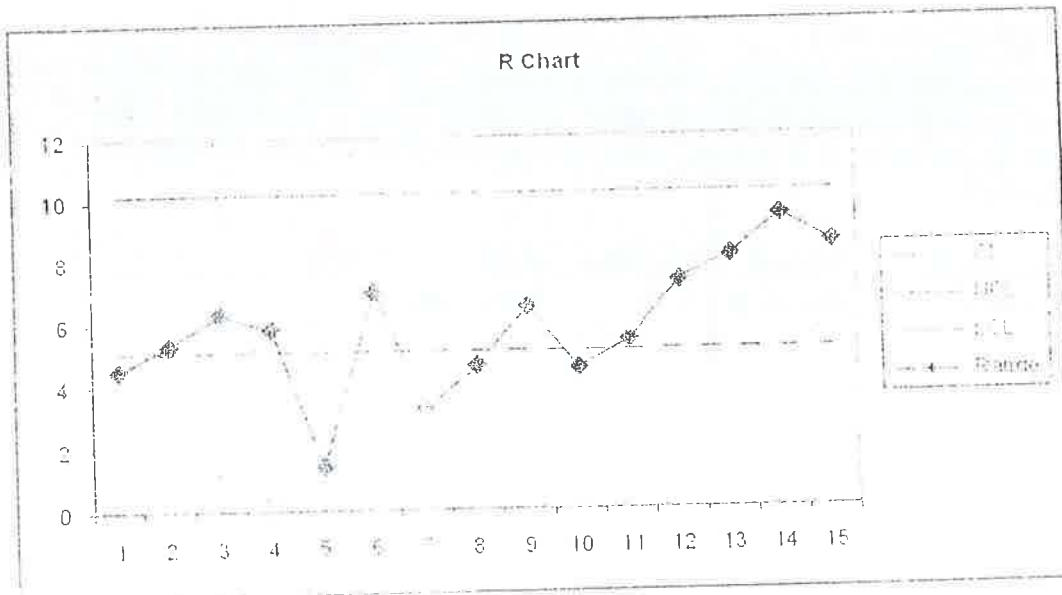
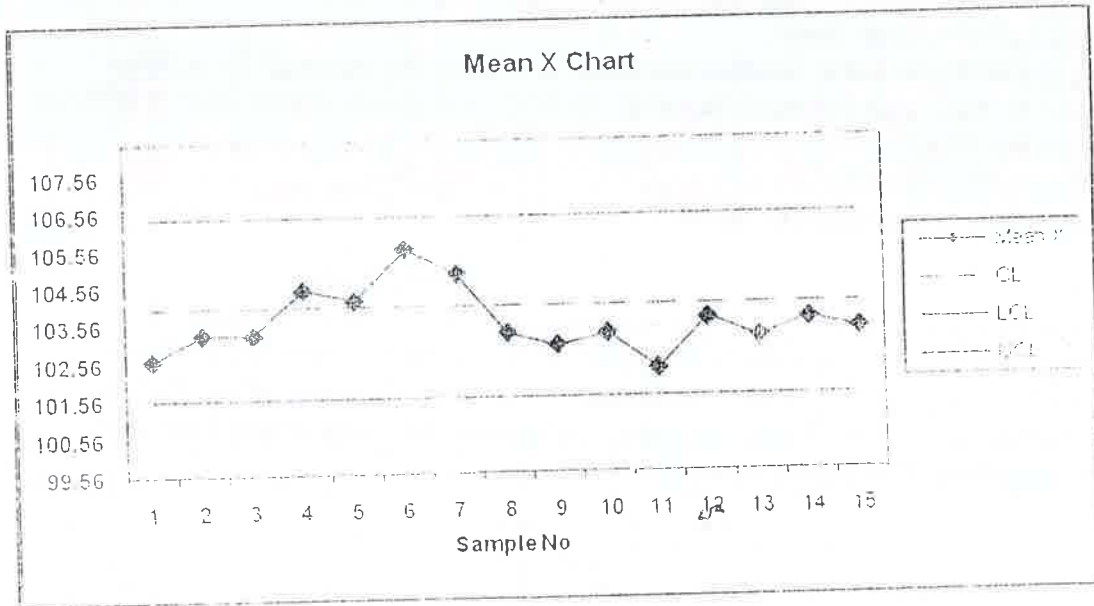
10 Marks

Q4.

Given below are Mean X and R charts for a process. The parameters for the process are as follows

Mean	104	Sample Size	6
SD	2	Sampling Frequency	45 minutes
Sample Size	6		

Comment on the state of process. State at what point will you be alarmed (if at all) and what is the course of action you will take.



PRODUCTION MANAGEMENT

SECTION II

Attempt in Separate Answer book

- Notes: 1. **Attempt any three questions.**
2. Make valid assumptions wherever necessary. State them clearly.
3. Be brief. Evaluation will be based on conceptual clarity.

- Q1. With reference to Schemener's Process Matrix, plot (approximately) the position of
- Fresh Fruit Juice Centers – franchise model having 250 outlets in major cities
 - Airlines Catering Service
 - Manpower Recruitment Firm – for senior management positions

Specify the *key issues* of "Degree of Labour Intensity" and "Degree of Interaction and Customisation" (for each of the above case) which the organization would encounter and should have competencies in place.

Q2. "See this machine here is only about 2 years old. Before we installed it we used other machines to do what it does. But this machine can do all the operations that used to take three different machines" says Bob.

He tells me how they used to process these parts using the three separate machines. The process time per part were 1 minutes on the first machine, 5 minutes on the second machine and 2 minutes on the third – a grand total of 8 minutes per part. But the new NCX-10 machine can do all the three processes in 3 minutes per part.

"With the old way we had more machines" he says. "We had 4 of the first type, 8 of the second type and 6 of the third type. Each of the machines had to have a machinist to run it. The NCX-10 only needs 3."

Is Bob moving the company towards its "GOAL"? What should be the optimum decision for Bob's company?

Q3. You were requested to study a catalogue of any consumer durable (other than mobile phone or laptop). Enumerate five preventive maintenance points.

Q4. You are invited by a college to speak to undergraduate students on

- a. Revenue or Yield Management for service companies having low degree of labour intensity

OR

- b. Poka-Yoke in Service Industry for 30 minutes. Enumerate 15 points which you will cover in your talk in the form of a note. [You will obviously carry a note (which you can refer to during your talk.)]

Q5. In a manufacturing plant, the following data is available:

Products	Selling Price (\$ per unit)	Variable Expenses (\$ per unit)	Production Rate (Units per day)
A	1000	800	1000
B	1500	1000	800
C	3000	2500	500

D	1850	1200	700
E	950	800	1400
F	1800	1400	800
G	2200	1850	800
H	2500	2200	400
I	1200	1000	1100
J	1800	1200	600

Annual Operating Expenses are \$ 54.5 million.

Desired Profits are \$ 60 million

Number of Working Days the plant operates is 285

Using TOC, classify the product(s) into Winners, So so and Resignation products.

JAMNALAL BAJAJ INSTITUTE OF MANAGEMENT STUDIES
UNIVERSITY OF MUMBAI

MFM/MMM/MHRDM/MIM I SEMSTER II

27th April 2011

Duration 3 hrs

M. Marks 100

PRODUCTION MANAGEMENT

Notes: 1. Attempt any three questions.

2. Make valid assumptions wherever necessary. State them clearly.

3. Be brief. Evaluation will be based on conceptual clarity.

Q1. With reference to Schemener's Process Matrix, plot (approximately) the position of

- A General Entertainment broadcasting channel (Capital Investment of \$ 2,000 million, Salaries of Rs 600 million p.a.)
- A call centre with 400 employees operating in India, for a US based insurance company
- A courier service company
- A coaching class for SSC & HSC students
- A rent-a-car agency having 20 cars
- Private bus service plying between Mumbai and Nasik with 12 buses
- A "low - cost airline"

Specify the *key issues* of "Degree of Labour Intensity" and "Degree of Interaction and Customisation" (for each of the above case) which the organization would encounter and should have competencies in place.

Q2. You are invited by a college to speak to undergraduate students on

a. Poka - Yoke

or

b. DFMA

or

c. Visit to Mc Donald's kitchen

for 30 minutes. Enumerate 15 points which you will cover in your talk in the form of a note. [You will obviously carry a note (which you can refer to during your talk.)]

Q3. At the Department of Motor vehicles, the process of getting license plates for your car begins when you enter the facility and take a number. You walk 50 feet to the waiting area. During your wait, you count about 30 customers waiting for service. You also find many customers become discouraged and leave. When a number is called, if a customer stands, the ticket is checked by a uniformed person, and the customer is directed to the available clerk. If no one stands up, several minutes are lost while the same number is called repeatedly. Eventually the next number is called. And more often than not, that customer has left too. The DMV clerk has now been idle for several minutes, but does not seem to mind.

After 4 hours, your number is called and checked by the uniformed person. You walk 60 feet to the clerk, and the process of paying city sales taxes is completed in 4 minutes.

The clerk then directs you to the waiting area for paying state personal property tax, 80 feet away.

With a sinking heart, you take a different number and sit down with some different customers who are just renewing licenses.

A 1-hour, 40 minutes wait this time, and a walk of 25 feet you pay your property taxes in a process that takes 2 minutes.

Now that you have paid taxes you are eligible to pay registration and license fees. The registration and license customers are called in the same order in which personal property taxes were paid. There is only a 10-minute wait and a 3-minute process.

You receive your license plates, take a minute to abuse the license clerk, and leave exactly 6 hours after arriving.

Make a process chart to depict this process, and suggest improvements.

Q4. "See this machine here is only about 2 years old. Before we installed it we used other machines to do what it does. But this machine can do all the operations that used to take three different machines" says Bob.

He tells me how they used to process these parts using the three separate machines. The process time per part were 2 minutes on the first machine, 8 minutes on the second machine and 4 minutes on the third – a grand total of 14 minutes per part. But the new NCX-10 machine can do all the three processes in 6 minutes per part.

"With the old way we had more machines" he says. "We had 2 of the first type, 5 of the second type and 3 of the third type. Each of the machines had to have a machinist to run it. The NCX-10 only needs 2.

Plot the best and worst case graphs of WIP vis-à-vis CT and TH for the old multi-machine scene and the NCX-10 scene and give your comments.

Is Bob moving the company towards its "GOAL"? What should be the optimum decision for Bob's company.

Q5. The past sales performance and the future expectations of sales of a consumer durables manufacturer are given below:

Year	Sales
2003	12,998 units
2004	14,202 units
2005	14,481 units
2006	14,814 units
2007	17,255 units
2008	18,837 units
2009	19,408 units
2010	21,133 units
2011	24,200 units expected

Steps / Indicator / Time / Value

2012	37,000 units forecasted
2013	41,000 units forecasted
2014	43,000 units forecasted
2015	44,000 units forecasted
2016	45,000 units forecasted
2017	45,000 units forecasted

The Central Government had reduced excise duty from 40 % to 32 % in 2003 and has further reduced the duty to 16 % in 2006. Industry sources believe that the duty may be rationalized at 8 % soon.

The current capacity is 27,000 units if plant is operated on three-shifts basis (18,000 units on two shifts basis). The management policy is to run the plant on two-shifts only; the third shift is reserved for maintenance and any other exigencies. Hence, you can notice that the operations have been carried out to a small degree in the third shift in 2008 and 2009, and a substantial degree in 2010 and 2011. Workmen have been given overtime, temporary workmen have been employed, delivery lead times have been stretched and maintenance has been compromised to meet the sales demand. The matter of fact is that sales team requires 30,000 units in 2011 but this demand cannot be satisfied, and hence the management has budgeted 24,000 units.

The plant has three parallel lines of nearly equal capacities. Line 1 with a capacity of 3,600 units was installed in 1980; Line 2 having a capacity of 5,400 units was installed in 1985 and a Line 3 having a capacity of 18,000 units was installed in 1995. All the above-mentioned capacities are on three shifts basis.

Currently, manufacturing lines with capacity of 40,000 units (on three shifts basis) are available and exhibit considerable reduction (nearly 35 % less than the current levels) in the operating expenses per unit. Old technology lines are available too at lower fixed assets value, but operating expenses would be at current levels.

The management wishes to expand capacity, since the demand over the last three years have demonstrated the strength of the company's brand and the operations' resources have been strained for more than a year.

If machines and equipment are ordered now, they will be available by end 2011 for normal production.

Prepare a proposal recommending the capacity decision with the rationale. (You may decide to discard the old lines too).

Jamnalal Bajaj Institute of Management Studies
University of Mumbai
First Year Second Semester
MIM/MHRDM/MFM/MMM
Sub : Production Management

Date : 27.04.2010

Marks – 100

Time – 3 Hours

Instructions : Question 1 is compulsory. Attempt any 3 out of the rest

Q1. Attempt any 5 questions

20 Marks

- 1) What is manufacturing system? Explain various types in brief
- 2) 'The primary purpose of reorder level in 'Fixed Period Review Model' is to take care of variations in consumption rate' – True or false? Explain your answer
- 3) What is the benefit of 'Fixed Period Review System' other than the cost of monitoring?
- 4) 'EOQ is a myth' – Comment
- 5) What is Basic Function and Secondary function in Value Analysis
- 6) The manufacturing and finance functions share a healthy relationship – pl comment
- 7) Explain what each of these symbols mean in method study? ∇ , D
- 8) 'Production Scheduling and material movement in a process layout is more complex than that in a product layout'. Explain
- 9) List at least 4 important factors influencing the decision on plant location
- 10) Explain practical examples each where you will use CPM and PERT network mode!

Q2. Answer any 4

10 Marks

- A. Explain product process matrix
- B. Recommend process layout with brief justification for the following. You may state assumptions made about resource capacities, business model (standard products, customised products or both)
 - (ii) Overhead Crane manufacturing
 - (iii) Kitchen operations in a Thali restaurant
 - (iv) Serving Operations in a Thali restaurant
 - (v) Florist
- C. Explain why organizations hold inventory
- D. Explain basic tenets of TQM.
- E. Who are the major contributors to TQM. Explain any one in detail.

P.T.O

Q3.

10 Marks

Stripes and Claws Adventures arrange tiger safari tours with a promise of tiger spotting. A typical group consists of 6 persons, first scanning a section of the forest by a jeep followed by ride on an elephant where the elephants go closer to the tiger. On 30th April, there are 5 groups that wish to see tigers. M/s S&C adventure have 2 guides and each family must be accompanied by a guide either in jeep or on an elephant. Thus guide in jeep will escort first group and then hand them over to the guide on elephant before he can take up the next group. based on the zone chosen by the group, following are the estimates for tour times for each group. Suggest a sequence in which the jeep guide should escort the groups so as to minimise the time when the last group leaves forest. Find the time when the last group will complete their tour.

Duration in minutes	Jeep Tour	Elephant Tour
Group 1	60	45
Group 2	25	60
Group 3	40	80
Group 4	35	50
Group 5	15	70

Q4.

10 Marks

Given below are activities in a project. Find the total duration of the project & critical path & Total Floats using CPM.

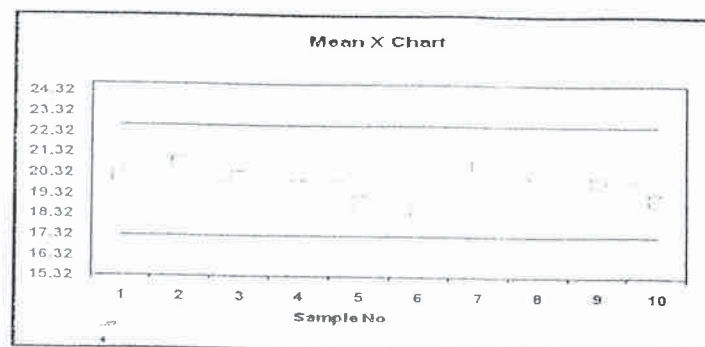
Activity	Duration	Immediate Predecessors
A	10	-
B	8	A
C	11	A
D	7	A
E	5	B
F	4	C
G	6	D
H	9	G,F
I	2	E,H
J	8	I

Q5.

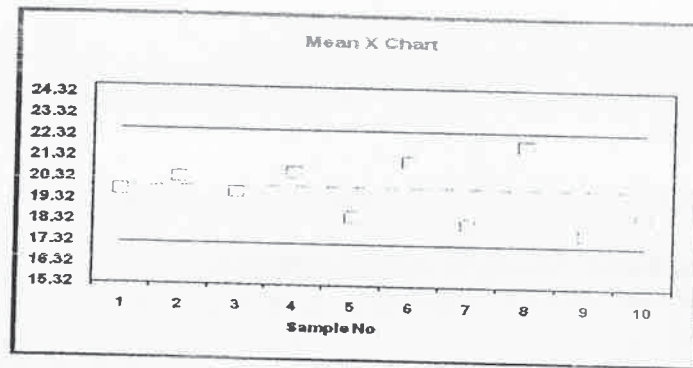
10 Marks

Given below are 3 different mean X & R charts. Comment on the state of process and recommended action

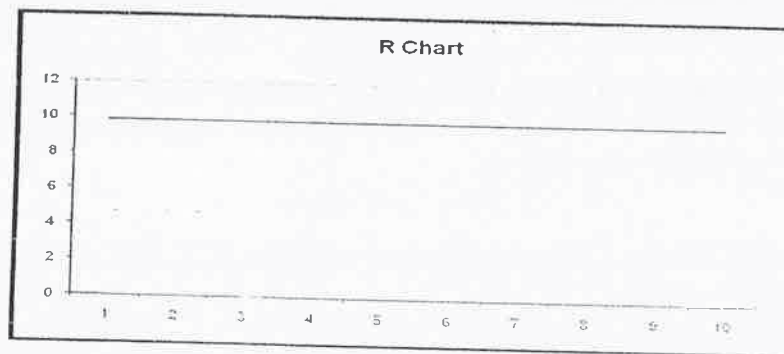
(i) Case 1



(ii) Case 2



(iii)



Q6.

10 Marks

A) "I feel we are in a slowly moving towards a mess" said Mr Udayan Sethi the MD of a Surgical Equipment manufacturing firm. "We hardly have any cash left with us as we are spending more money on rectifying our faults than what we spend on manufacturing products". The quality In-charge was speechless and had no clue how to go about the situation. New BPR consultant was recommending a fresh look at the situation and insisting on building a new system. However, Mr. Shailesh Dixit, the Head of operations was adamant on refusing the BPR implementation. "Lets continue with the TQM philosophy we started last month, I am sure the results will come" said Mr Dixit. Mr Udayan Sethi was clueless.

As an observer what would you advise Mr Udayan Sethi, to go for BPR or TQM?

B) Please Discuss the factors you will consider for setting up a plant making "Mobile handset" manufacturing unit.

SECTION B

- Notes: 1. Attempt any 3 out of 5 questions.
2. Make valid assumptions wherever necessary. State them clearly.
3. Be brief. Evaluation will be based on conceptual clarity.

Q1. With reference to Schemener's Process Matrix, plot (approximately) the position of

- A fast food joint, having 50 outlets in Mumbai
- A call centre with 400 employees operating in India, for a US based insurance company
- A taxi service in Mumbai having a fleet of 500 cars operating only from and to the domestic and international airports
- A courier service company
- A "low – cost airline"

Specify the *key issues* of "Degree of Labour Intensity" and "Degree of Interaction and Customisation" (for each of the above case) which the organization would encounter and should have competencies in place.

Q2. You are invited by a college to speak to undergraduate students on

- a. Poka – Yoke
- or
- b. DFMA

for 30 minutes. Enumerate 15 points which you will cover in your talk in the form of a note. [You will obviously carry a note (which you can refer to during your talk.)]

Q3. At the Department of Motor Vehicles (DMV), the process of getting license plates for your car begins when you enter the facility and take a number. You walk 50 feet to the waiting area. During your wait, you count about 30 customers waiting for service. You also find many customers become discouraged and leave. When a number is called, if a customer stands, the ticket is checked by a uniformed person, and the customer is directed to the available clerk. If no one stands up, several minutes are lost while the same number is called repeatedly. Eventually the next number is called. And more often than not, that customer has left too. The DMV clerk has now been idle for several minutes, but does not seem to mind.

After 4 hours, your number is called and checked by the uniformed person. You walk 60 feet to the clerk, and the process of paying city sales taxes is completed in 4 minutes. The clerk then directs you to the waiting area for paying state personal property tax, 80 feet away.

With a sinking heart, you take a different number and sit down with some different customers who are just renewing licenses.

A 1-hour, 40 minutes wait this time, and a walk of 25 feet you pay your property taxes in a process that takes 2 minutes.

Now that you have paid taxes you are eligible to pay registration and license fees. The registration and license customers are called in the same order in which personal property taxes were paid. There is only a 10-minute wait and a 3-minute process.

You receive your license plates, take a minute to abuse the license clerk, and leave exactly 6 hours after arriving.

Make a process chart to depict this process, and suggest improvements.

Q4 (a). In a manufacturing plant, the following data is available:

Products	Selling Price (Rs per unit)	Variable Expenses (Rs per unit)	Production Rate (Units per day)
A	1000	800	1100
B	1500	1100	800
C	3000	2500	500
D	1800	1200	700
E	950	800	1400
F	1800	1400	800
G	2200	1800	800
H	2500	2000	400
i	1200	900	1000
J	1800	1200	600

Annual Operating Expenses are Rs 560 Lakhs.
Number of Working Days the plant operates is 280

Using TOC, determine the product(s) which is / are to be abandoned.

Q4 (b). "See this machine here is only about 2 years old. Before we installed it we used other machines to do what it does. But this machine can do all the operations that used to take three different machines" says Bob.

He tells me how they used to process these parts using the three separate machines. The process time per part were 2 minutes on the first machine, 8 minutes on the second machine and 4 minutes on the third – a grand total of 14 minutes per part. But the new NCX-10 machine can do all the three processes in 6 minutes per part.

"With the old way we had more machines" he says. "We had 2 of the first type, 5 of the second type and 3 of the third type. Each of the machines had to have a machinist to run it. The NCX-10 only needs 2.

Is Bob correct in believing that he is working towards the GOAL of the company?

Q5. The past sales performance and the future expectations of sales of consumer durables manufacturer are given below:

Year	Sales
2001	14,998 units
2002	15,202 units
2003	15,481 units
2004	15,814 units
2005	16,255 units
2006	16,837 units
2007	17,408 units
2008	19,133 units
2009	25,013 units
2010	37,000 units forecasted
2011	41,000 units forecasted
2012	43,000 units forecasted
2013	44,000 units forecasted
2014	45,000 units forecasted
2015	45,000 units forecasted

The Central Government had reduced excise duty from 40 % to 32 % in 2007 and has further reduced the duty to 16 % in 2009. No further reduction in duty is expected in the next 2 - 3 years. However, industry sources believe that the duty may be rationalized at 8 % later on.

The current capacity is 27,000 units if plant is operated on three-shifts basis (18,000 units on two shifts basis). The management policy is to run the plant on two-shifts only, the third shift is reserved for maintenance and any other exigencies. Hence, you can notice that the operations have been carried out to a small degree in the third shift in 2008, and a substantial degree in 2009. Workmen have been given overtime, temporary workmen have been employed, delivery lead times have been stretched and maintenance has been compromised to meet the sales demand. The matter of fact is that sales team required 30,000 units in 2009, but this demand cannot be satisfied, and hence the management had budgeted 25,000 units.

The plant has three parallel lines of nearly equal capacities. Line 1 with a capacity of 3,600 units was installed in 1975; Line 2 having a capacity of 5,400 units was installed in 1980 and a modern Line 3 (consisting of faster, bigger equipments) having a capacity of 18,000 units was installed in 1990. All the above-mentioned capacities are on three shifts basis.

Currently, manufacturing lines with capacity of 40,000 units (on three shifts basis) are available and exhibit considerable reduction (nearly 35 % less than the current levels) in the operating expenses per unit. Old technology lines are available too at lower fixed assets value, but operating expenses would be at current levels.

The management wishes to expand capacity, since the demand in 2008 and 2009 has demonstrated the strength of the company's brand and the operations' resources have been strained for more than a year.

If machines and equipment are ordered now, they will be available by end 2010 for normal production. You can mothball old lines as part of your decisions. Prepare a proposal recommending the capacity decision with the rationale.

Jamnalal Bajaj Institute of Management Studies

Part Time Masters Course
Production Management Supplementary Examination

SECTION 1 – 1.5 hours (50 Marks)

- Note: 1. Attempt any 2 questions from Section A & B each.
2. Make valid assumptions wherever necessary. State them clearly.

Date: 2-5-09

Part A

Q1. Answer any 3

15 Marks

1. Explain the five primary questions asked in method study with objective for each question
2. What are the key differences between BPR & Kaizen
3. Explain The in brief how Quality Circles function
4. Explain Product-Process matrix
5. Explain PDCA Cycle
6. Explain in brief any 5 of the 7 simple QC tools

Q2.

15 Marks

Explain Johnson's 2 machine rule & solve the following problem.
There are 8 jobs to be processed in the sequence M1-M2. Find the optimal sequence with the make-span. Also find the idle time for M2

Job	1	2	3	4	5	6	7	8
M1	8	9	5	7	3	7	2	8
M2	10	6	8	4	6	9	6	10

Q3.

15 Marks

For a project, the normal durations for each activity are as given below.
Find the total project duration using 'Forward Pass & Backward Pass'.
Find the Critical Path.

Activity	Immediate Predecessor	Normal Duration
A	-	6
B	-	7
C	A	4
D	B	12
E	C,D	12
F	E	9
G	E	4
H	G	10
I	F	10
J	H,I	9

Jamnalal Bajaj Institute of Management Studies

Part B

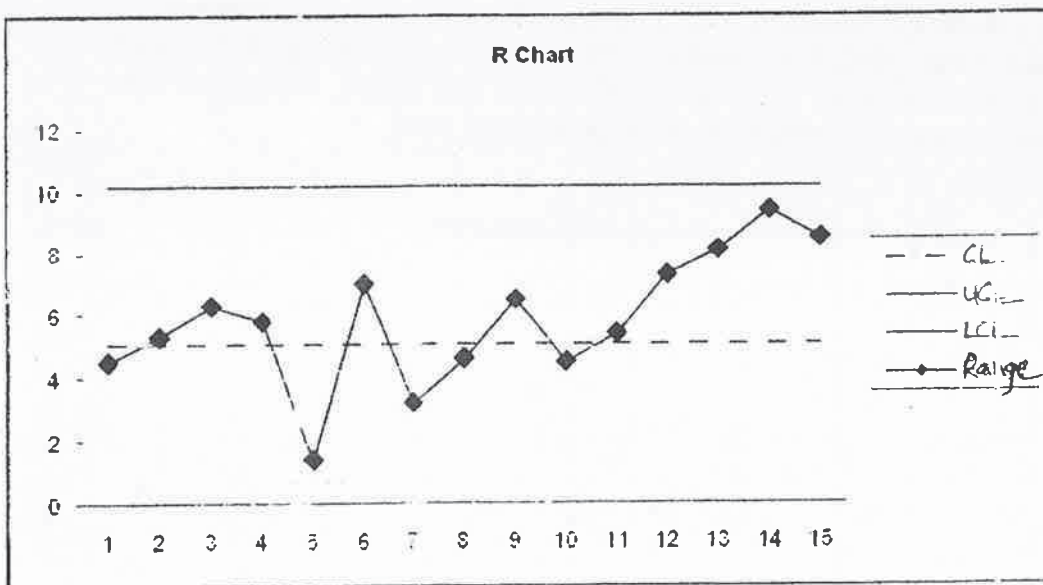
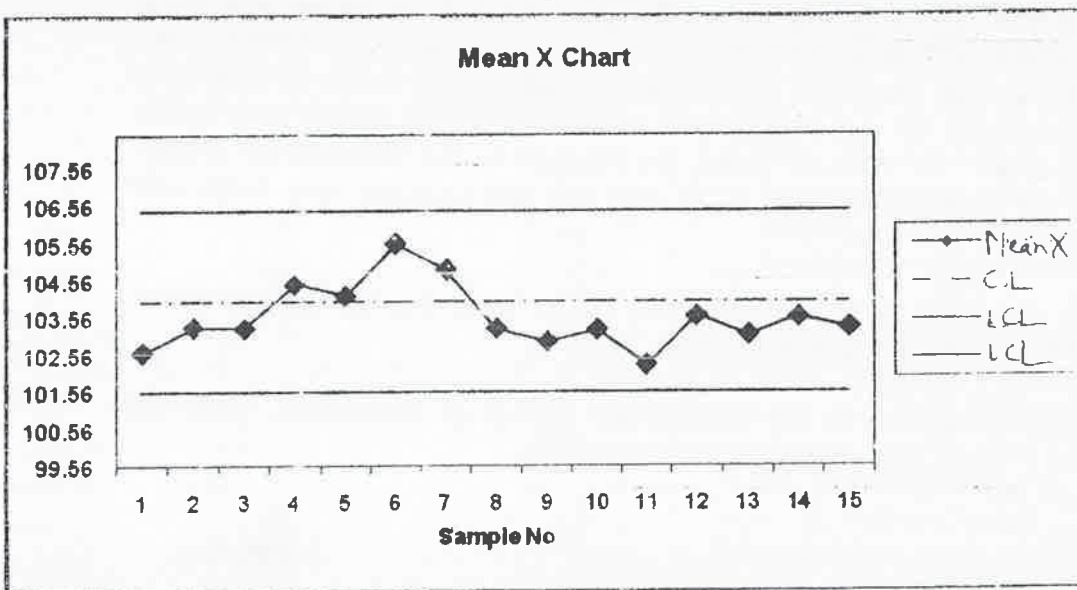
Q4.

10 Marks

Given below are Mean X and R charts for a process. The parameters for the process are as follows

Mean	104	Sample Size	6
SD	2	Sampling Frequency	45 minutes

Comment on the state of process. State at what point will you be alarmed (if at all) and what is the course of action you will take.



Standard:

Direct labor hour per unit.....	2.5 hours
Variable overhead per direct labor hour...	Rs.1.75
Fixed overhead per direct labor hour.....	Rs.3.10
Budgeted variable overhead.....	Rs.21,875
Budgeted fixed overhead.....	Rs.38,750

Actual:

Direct labor hours.....	10,000 hours
Variable overhead.....	Rs.26,250
Fixed overhead	Rs.38,000

What is the efficiency variance using the three-variance approach?

Rs.9,937.50 F; (b) Rs.2,187.50 F; (c) Rs.2,187.50 U; (d) Rs.2,937.50 F.

(II) The Larson company makes three unique wood products: desks, chairs and footstools. For 1999, the company expects to have available 24,000 labor hours. The average hourly labor rate is Rs.25. The following information is available for the current product line: **5 MARKS**

	<u>Desks</u>	<u>Chairs</u>	<u>Footstools</u>
Selling price.....	Rs.900	Rs.680	Rs.240
Variable costs:			
Direct material.....			
Direct labor.....	Rs.220	Rs.160	Rs. 60
Variable overhead.....	300	275	75
Variable selling.....	180	120	41
Fixed costs:	20	15	10
Factory.....			
Selling & Administrative.....	Rs.150,000		
	75,000		

The company has a policy of devoting no more than 50% of its available skilled labor capacity to any one product and at least 20% to every product.

Required: How many units of each product must the company make to maximize its profit?

single prop
 Q7. In a sample of 500 people in Kerala, 280 are tea drinkers and the rest are coffee drinkers. Can we assume that both coffee and tea are equally popular in this State at 1% level of significance?

single mean
 b) A sample of 400 male students is found to have mean height of 171.38 cms. Can it be reasonably regarded as a sample from a large population with mean height 171.17 cms and s.d. 3.30 cms.

2. diff of mean
 Q18. Intelligence test given to two groups of boys and girls gave the following results.

Girls: Mean Marks = 78, S.D. = 12, N = 80
 Boys: Mean Marks = 75, S.D. = 15, N = 120

Is the difference in the mean scores significant?

Q 9. A certain drug is claimed to be effective in curing colds. In an experiment on 164 people with cold, half of them were given the drug and half of them given sugar pills. The patients' reactions to the treatment are recorded in the following table.

	Helped	Harmed	No. effect	Total
Drug	52	10	20	82
Sugar Pills	44	12	26	82
Total	96	22	46	164

On the basis of this data can it be concluded that there is a significant difference in the effect of the drug and sugar pills?

Q 10. A farmer applies three types of fertilizers on 4 separate plots. The figures on yield per acre are tabulated below:

Fertilizers Plots →	Yield				Total
	A	B	C	D	
Nitrogen	12	8	16	12	48
Potash	14	12	12	18	48
Phosphates	16	10	20	18	48
Total	42	30	48	48	168

Find out if the plots are materially different in fertility, as also, if the three fertilizers make any material difference in yields.
