

BITS, Pilani – Dubai  
Dubai International Academic City, UAE  
First Semester 2007- 2008  
MEUC 412 – Production Planning and Control

**Test 1**

Date	21 <sup>st</sup> October 2007
Duration	50 minutes
Component	Test 1 ( closed book)
Maximum marks	20
Weight	25%

1 What are the four basic types of production processes? How do they differ from one another - give examples? (3)

2 Decide among the various investment alternatives on manufacturing facilities either in South Korea, China, Taiwan, Poland Or Mexico. (5)  
The table provides the estimated cost in each country as follows

Country	Economic/ Political Climate		
	Decline	Same	Improve
South Korea	21.7	19.1	15.2
China	19	18.5	17.6
Taiwan	19.2	17.1	14.9
Poland	22.5	16.8	13.8
Mexico	25.0	21.2	12.5

Determine the best decision using the following decision criteria – Maximin, Minimax, Hurwicz (  $\alpha = 0.40$  ) and equal likelihood.

3 Your company is considering whether it should tender for two contracts (C1 and C2) on offer from a government department for the (8)  
supply of certain components. If tenders are submitted, the company will have to provide extra facilities, the cost of which will have to be entirely recouped from the contract revenue. The risk, of course, is that if the tenders are unsuccessful then the company will have to write off the cost of these facilities.

The extra facilities necessary to meet the requirements of contract C1 would cost £50,000. These facilities would, however, provide sufficient capacity for the requirements of contract C2 to be met also. In addition the production costs would be £18,000. The corresponding production costs for contract C2 would be £10,000.

If a tender is made for contract C2 only, then the necessary extra facilities can be provided at a cost of only £24,000. The production costs in this case would be £12,000.

It is estimated that the tender preparation costs would be £2,000 if tenders are made for contracts C1 or C2 only and £3,000 if a tender is made for both contracts C1 and C2.

For each contract, possible tender prices have been determined. In addition, subjective assessments have been made of the probability of getting the contract with a particular tender price as shown below. Note here that the company can only submit one tender and cannot, for example, submit two tenders (at different prices) for the same contract.

	Possible tender prices	Probability of getting contract
Tendering for C1 only	120,000	0.30
	110,000	0.85
Tendering for C2 only	70,000	0.10
	65,000	0.60
	60,000	0.90
Tendering for both C1 and C2	190,000	0.05
	140,000	0.65
	100,000	0.95

BITS, Pilani – Dubai  
Dubai International Academic City, UAE  
First Semester 2007- 2008  
MEUC 412 – Production Planning and Control

In the event that the company tenders for both C1 and C2 it will either win both contracts (at the price shown above) and no contract at

~~all contracts~~ ~~the decision tree and~~

1. What do you suggest the company should do and why?
2. What is the "downside" of your suggested course of action?

4 The production and home delivery of a pizza is a relatively straight forward and simple process. Develop a fish bone diagram to identify potential defects and opportunities for poor quality in the system.

(4)

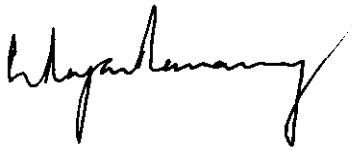
Test I

BITS, Pilani – Dubai  
Dubai International Academic City, UAE  
First Semester 2007- 2008  
MEUC 412 – Production Planning and Control

14

**ANSWER SCHEME**

1. Example for each type of production system. (3 marks)
2. Application of each criteria (4 marks)  
Final decision (1 mark)
3. Decision tree construction – 4 marks
  - a. Suggestion (2. marks)
  - b. Course of action (2 marks)
4. Listing of defects and opportunities for poor quality in the system (2marks)
  - a. Construction of Fish bone diagram (3 marks)



BITS, Pilani – Dubai  
Dubai International Academic City, UAE  
First Semester 2007- 2008  
MEUC 412 – Production Planning and Control  
Test -II

Date 6<sup>th</sup> November 2007  
Duration 50 minutes  
Component Test -II (Open book)  
Maximum marks 20  
Weight 20%

- 1 A project consists of the following activities. Draw the network of the activities and find the critical path (2.5)

Activity	Predecessor activity	Time (Week)
A	---	3
B	---	5
C	---	7
D	C	3
E	A, B	7
F	E, D	3
G	D	2
H	F, G	2

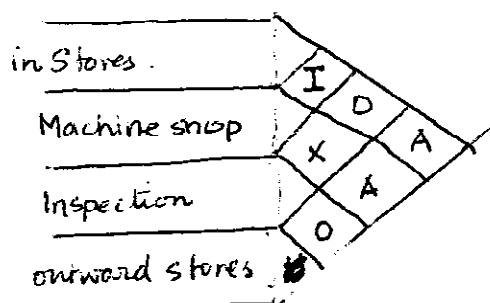
- 2 The following is the sales details collected for the past two years. *Develop a seasonally adjusted forecast model for best occupancy for the sales.* (5.0)

2005	Month	1	2	3	4	5	6	7	8	9	10	11	12
	Data	718	489	561	622	668	721	813	836	1035	1230	1062	802
2006	Month	1	2	3	4	5	6	7	8	9	10	11	12
	Data	733	476	549	652	690	718	823	876	1079	1203	1070	857

- 3 What are the objective of layout design (2)  
4 Construct a QFD matrix identifying the customer's needs and the engineering characteristics, QFD is used as a tool to improve the quality of education in your college. (5)  
5 The following are the samples collected on the waiting time of certain operations in a machining process. (2.5)  
Comment on the process by developing  $\bar{X}$  and R chart

Sample	Waiting time (min)				
	1	2	3	4	5
1	27	18	20	23	19
2	22	25	31	40	17
3	16	15	22	19	23
4	35	27	16	20	24
5	21	33	45	12	22
6	17	15	22	20	30
7	25	21	26	33	19
8	15	38	23	25	31
9	31	26	24	35	32
10	28	23	29	20	27

- 6 Draw a layout plan based upon the space relationship chart shown below (3)



BITS – PILANI, DUBAI  
DUBAI INTERNATIONAL ACADEMIC CITY  
DUBAI  
ME UC412 – PRODUCTION PLANNING AND CONTROLS

DATE	02/01/08
DURATION	3 HRS
WEIGHTAGE	40%
TYPE	CLOSED BOOK

**Part –A**      (10x 1 = 10)

- 1 Explain the difference between made to stock, made to order and assemble to order products with examples.
- 2 How does customer's perspective of quality differ from the producers?
- 3 What is the difference between tolerance and control limits?
- 4 What is the purpose of QFD?
- 5 What is the purpose of project crashing analysis?
- 6 Differentiate between linear and multiple regression.
- 7 Distinguish between a process and product layout. Give an example for each.
- 8 Explain the ABC inventory classification system and indicate its advantages.
- 9 How the Master Production Schedule (MPS) is created and how is it useful.
- 10 Differentiate between Push and Pull environment of manufacturing

**PART – B**      (5 x 6 = 30)

**Section I**

- 1 What is a kanban system? Describe how production and withdrawal kanban works with a neat sketch, indicating the flow of information and kanban in a manufacturing system (2)
- 2 A company produces two types of cotton cloth – denim & corduroy. Corduroy requires 7.5kg of raw cotton per yard whereas denim requires 5 kgs of raw cotton. A meter of corduroy requires 3.2 hours of processing time, while for that of denim it is 3.0hours. The demand for denim is unlimited but for that of corduroy the maximum demand is 510meters. The manufacturer has 6500kgs of cotton and 3000 hours of processing time in a given duration. He makes a profit of Rs.2.25/- per meter in a denim and Rs. 3.10/- per meter in corduroy. Formulate a linear programming model for this problem and solve it graphically. (2)
- 3 A foundry involved in manufacturing gear blanks uses C- chart to control the quality of its casting. The following are the data obtained from 20 samples collected from various lots. Comment on the process. (2)

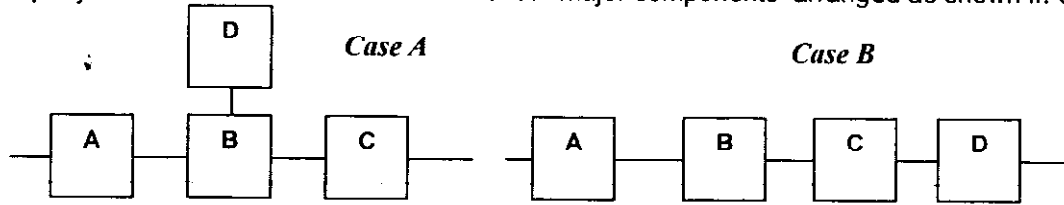
Sample no	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
No of defects	12	8	7	6	1	3	2	16	8	5	4	3	5	18	12	13	7	7	2	1

**Section II**

BITS – PILANI, DUBAI  
DUBAI INTERNATIONAL ACADEMIC CITY  
DUBAI  
ME UC412 – PRODUCTION PLANNING AND CONTROLS

- 4 Describe the objectives of Failure Mode Effect Analysis (FMEA), perform a FMEA to the case of starting your automobile. (2)

- 5 A company manufactures oil seals which has four major components arranged as shown in Case A. (4)



The company purchases the components from three different vendors whose has the following reliability

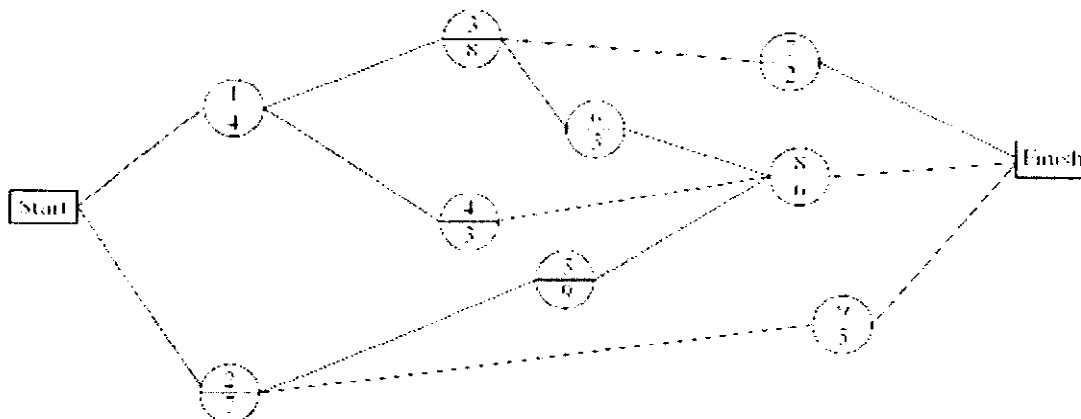
Components	Vendors		
	1	2	3
A	0.94	0.84	0.92
B	0.86	0.88	0.90
C	0.90	0.93	0.95
D	0.93	0.95	0.90

If the company has decided to use only one vendor to supply all four components, which vendor should be selected? If the product flow is as in "Case B" would your decision change.

### Section III

- 6 What type of layout would be appropriate for the following (2)
- A grocery store
  - Home Construction
  - Electronics Assembly
  - A university

- 7 (4)



For the given network with activity times in months, determine the earliest start and finish times, latest start and finish times, and slack for each activity. Indicate the critical path and the project duration.

BITS – PILANI, DUBAI  
DUBAI INTERNATIONAL ACADEMIC CITY  
DUBAI  
ME UC412 – PRODUCTION PLANNING AND CONTROLS

**Section IV**

- 8 A company produces 10,000 bags of sugar, Operating 250 days in a year. Immediately upon receiving an order, the firm begins delivery at the rate of 60 bags per day. The firm has determined that the ordering cost as Rs 1600/- per order and the cost of carrying sugars in inventory before they are processed is Rs.15/- on an annual basis. Determine the following (4)
- a. the optimal order size
  - b. the total inventory cost associated with the optimal order quantity
  - c. the number of operating days between orders
  - d. the number of operating days required to receive as order
- 9 What is the under lying principle in Drum buffer rope concept of managing the system. How is the bottleneck resource identified in the system? (2)

**Section V**

- 10 A workshop engaged in repairing cars has one denter and a painter. Currently there are six cars to be attended. The following estimates in hours are the time needed for denting and painting on the cars. Use Johnson's algorithm to schedule. What is the sequence that completes all the jobs in minimum time? Show the corresponding schedule of the job using a Gantt chart. (4)

Car	1	2	3	4	5	6
Denting time (hrs)	4	7	3	12	11	9
Painting time (hrs)	11	7	10	8	10	13

- 11 What is the underlying principle of Lean manufacturing (2)