



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 6 Examination in Engineering: December, 2018

Module Number: ME 6304

Module Name: Production Planning and Control

[Three Hours]

[Answer all questions, each question carries 12 marks]

Q1.

- a) "The accuracy of key production planning and control decisions is a significant factor for influencing the organization success or failure". Explain your view about this statement. [3.0 Marks]
- b) "Technology Forecast is important factor for new business startups". Explain your view about this statement. [3.0 Marks]
- c) The demand for "Imported Plastic Toys" in Sri Lanka from January 2018 to November 2018 is illustrate in the **Table Q1**.

Table Q1 :

Year	Demand \$
Jan	22,000
Feb	33,000
Mar	55,000
Apr	38,500
May	16,500
Jun	22,000
Jul	33,000
Aug	27,500
Sep	27,500
Oct	49,500
Nov	60,500

- (i) Provide your view on this demand variation pattern. [2.0 Marks]
- (ii) Forecast the demand for "Imported Plastic Toys" in the month of December-2018 by using simple moving average method. [2.0 Marks]
- (iii) An Investor expected to setting up "Plastic Toy" manufacturing factory in Sri Lanka. By considering the demand forecasting, technology forecasting and economic forecasting factors, Explain your advice for this investment. [2.0 Marks]

Q2.

- a) "Linear programming (LP) techniques consist of a sequence of steps that will lead to an optimal solution to problems that requires a decision or set of decisions about how best to use a set of limited resources to achieve a state goal of objectives". By providing examples, explain in which type of situations that the LP could be used in an organization to optimize its resource utilization. [3.0 Marks]
- b) What is the meaning of "Break Even Analysis" related to manufacturing company? Define the "Break Even Point" using suitable diagrams. [2.0 Marks]
- c) A group of undergraduates were decided to start a company producing household vacuum cleaners. They have conducted primary survey and found cost data as illustrated in the Table Q2. Furthermore, the students decided that the selling price of a vacuum cleaner as Rs.11,500.00.

Table Q2.

Primary cost components for producing a household vacuum cleaner (All the values are indicated in Rupees)	
Plastic pallets per 1000 units	120,000
Circuit equipment per 1000 units	30,000
Motors per 1000 units	6,500,000
Salaries	450,000
Power cables per 1000 units	275,000
Transportation	50,000
Insurance	100,000
Packing materials per 1000 units	55,000
Brushers per 1000 units	15,000
Other items per 1000 units	60,000
Utilities	150,000
Nails per 1000 units	60,000
SS poles per 1000 units	250,000
Advertising	50,000
Depreciation	200,000

- (i) Determine the Break Even Point of the proposed household vacuum cleaners manufacturing company. [4.0 Marks]
- (ii) Provide your suggestions and recommendations for this undergraduate group to start up their household vacuum cleaners manufacturing company. [3.0 Marks]

Q3.

A group of engineering graduates decided to startup a new company for manufacturing desktop computers. They have started their project plan and made the following conclusions with regards to their proposal.

- A. The following three product categories should be considered for their manufacturing assembly plant for catering different needs of the customers.
 - Low-performance desktop computers
 - Mid-performance desktop computers
 - High-performance desktop computers
- B. They have decided that the most suitable layout type is product layout
- C. They have decided that the output of a production line should be 100 units per hour.
- D. Table Q3 represents the work elements, element processing times and immediate predecessors identified for the assembly line

Table Q3

No	Element Description	T _e (minutes)	Preceded by
1	Check each internal component (Power Supply, Motherboard, CPU, GPU, RAM, Hard Disk, CD/DVD Drive)	1.2	-
2	Check each external component (Display, Keyboard, Mouse, Speaker/Subwoofer)	1	-
3	Coupling the motherboard to the casing.	0.8	1
4	Coupling the power supply to the casing.	0.6	1,3
5	Mounting the CPU on the motherboard.	0.45	1,3,4
6	Mounting the Heat Sink and CPU Cooling Fan.	0.55	5
7	Mounting RAM into the motherboard.	0.3	6
8	Mounting GPU (if necessary) into the motherboard.	0.35	6
9	Coupling CD/DVD Drive to the casing.	0.65	7,8
10	Coupling Hard Disk to the casing.	0.7	7,8
11	Plugging connectors within internal components.	0.5	9,10
12	Connecting External Devices (Display, Keyboard, Mouse)	0.4	2,11
13	Packaging of the PC for the shipment or storage	0.75	12

- a) Do you agree with their product category selection, justify your answer?
[2.0 Marks]
- b) Do you agree with their type of assembly line selection, justify your answer?
[2.0 Marks]

- c) (i) What is the desired cycle time? [1.0 Mark]
- (ii) What is the theoretical number of workstations in the above assembly line? [1.0 Mark]
- (iii) Find the efficiency and the balance delay of this assembly line. [3.0 Marks]
- (iv) Assuming the status of manual assembly process, calculate how many individuals should be employed to archive desired production rate. [3.0 Marks]

Q4.

- a) Briefly describe the following terms related to MRP,
 (i) Master Production Schedule [2.0 Marks]
 (ii) Bill of Materials [2.0 Marks]
- b) What are the reasons for keeping inventories? Briefly explain two of them. [2.0 Marks]
- c) Briefly explain the costs associated with the inventories. [2.0 Marks]
- d) Describe the purchasing parameters of an organization. [2.0 Marks]
- e) What is meaning of EOQ? Draw the model and give the formula for economic order quantity. [2.0 Marks]
- f) Discuss the applicability of JIT concept for the apparel industry [2.0 Marks]

Q5.

Assume that you were selected as a consultant engineer for starting an automobile manufacturing facility in Sri Lanka. You are asked to provide recommendations with brief justification for each of the recommendation to your client with regards to the following areas.

- a) What are the areas that your client should consider in selecting the location of the automobile plant? [1.0 Mark]
- b) How should be the forecasting approach? [1.0 Mark]
- c) What are the factors should be considered in capacity planning? [4.0 Marks]
- d) What are the key factors that should be considered in Systematic Layout Planning, Line Balancing, Production Planning and Inventory Management for this proposed automobile plant located in Sri Lanka [2.0 Marks]
- e) Prepare the terms of responsibilities (TOR) of the production engineer for the proposed automobile manufacturing plant. [2.0 Marks]
- f) Prepare the terms of responsibilities (TOR) of store manager for the proposed automobile manufacturing plant. [2.0 Marks]