UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 6 Examination in Engineering: February 2020

Module Number: ME 6304   **Module Name: Production Planning and Control**

[Three Hours]

[Answer all questions, Marks are indicated for each question]

Q1.

a) What are the main functions of production planning and control?

[2.0 Marks]

b) "Effective Production Planning and Control guarantees better utilization of resources". Comment on the statement by providing justification.

[4.0 Marks]

c) Your colleague is in a view that the "Production planning and control is not important to the service industry", explain your view on this by providing suitable examples.

[4.0 Marks]

Q2. a) What are the differences between qualitative and quantitative forecasting techniques?

[2.0 Marks]

b) You were asked to provide consultancy for introducing a new low-cost vehicle for Sri Lankan market. Explain how do you use the results obtained from qualitative and quantitative forecasting techniques for making initial stage decisions with regards to;

i) Capacity Planning

[1.0 Mark]

ii) Material Requirement Planning (Inventory Management)

[1.0 Mark]

iii) Scheduling

[1.0 Mark]

c) Monthly new registration of motor vehicles according to the Central Bank of Sri Lanka in year 2019 are listed in Table Q2c.1. Using 3 months Simple moving average method, forecast the new vehicle registration numbers for the 1st quarter of year 2020.

Table Q2c.1

Month (2019)	Number of new registrations
February	3127
March	3758
April	2734
May	2281
June	2045
July	3515
August	3515
September	3321
October	3499
November	2999

[3.0 Marks]

d) Yearly new registration of motor vehicles according to central bank of Sri Lanka is listed in the Table Q2d.1. Using liner regression method, forecast the new vehicle registration numbers for the year 2020.

Table Q2d.1.

Year	Quantity (Y)
2009	5762
2010	23072
2011	53848
2012	31546
2013	28380
2014	38758
2015	105628
2016	45172
2017	39080
2018	80776
2019	38388

[4.0 Marks]

Q3. a) The Government of Sri Lanka has initially planned to setup a new university for offering a degree titled the Bachelor of Education in Engineering Technology in Kuliyapitiya, Sri Lanka. More recently, the government has changed its location to Homagama, Sri Lanka. Provide your view on this location change by considering positive and negative factors.

[3.0 Marks]

b) Write four main principles in plant layout design

[2.0 Marks]

c) The Figure Q3c.1 illustrates the main steps of wind turbine manufacturing process
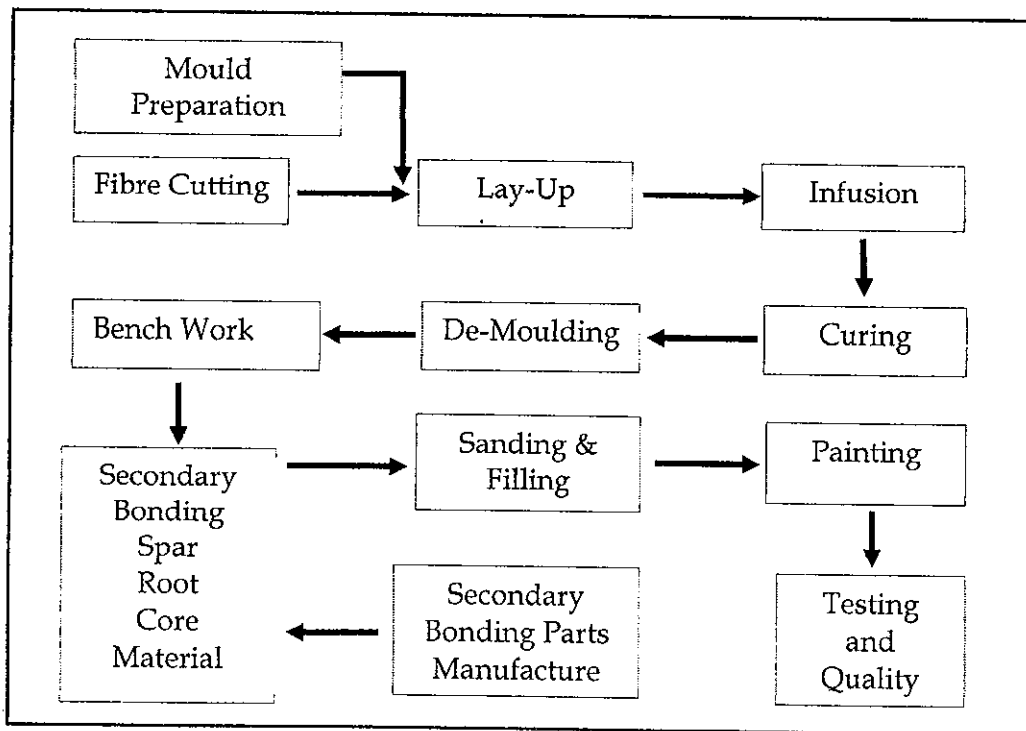

Figure Q3c.1

(i) Identify all the necessary departments required for a wind turbine blade manufacturing facility.

[2.0 Marks]

(ii) Draw a suitable plant layout for wind turbine manufacturing facility.

[3.0 Marks]

(iii) Justify your plant layout and individual department location selection by considering the main principles in plant layout design.

[2.0 Marks]

Q4. a) You were asked to design an assembly line balancing process for producing a clutch. The Table Q4a.1 illustrates main steps in the assembly process.

Table Q4a.1

No	Element Description	Time(mins)	Must be preceded by
1	Assemble Clutch cover and Diaphragm spring.	0.4	-----------------
2	Assemble the pressure plate with cover	0.4	1
3	Fix the Friction facing and marcel cushioning [Part A]	0.6	-----------------
4	Fix the part A and plate washer then fix the Cushion spring [Part B]	0.7	3
5	Fix the Hub damping spring and the Splined Hub [Part C]	1.0	-----------------
6	Assemble Part B, Part C and two Hub damping spring. [part D]	1.5	4,5
7	Assemble Part D and Cushion spring and plate washer with bolt and nuts [part E]	2.0	6
8	Fix the Part E and the Friction facing	0.6	7
9	Assemble the four Damper spring	2.0	8
10	packing	0.5	2,9

i) Draw precedence diagram

[2.0 Marks]

ii) What is the theoretical number of workstations in above assembly line?

[2.0 Marks]

iii) Find the efficiency and the balance delay of this assembly line.

[3.0 Marks]

b) Aggregate planning is an intermediate term planning decision. The following are the guidelines for aggregate planning:

- Determine corporate policy regarding controllable variables.
- Use a good forecast as a basis for planning.
- Plan in proper units of capacity.
- Maintain the stable workforce.
- Maintain needed control over inventories.
- Maintain flexibility to change.
- Respond to demand in a controlled manner
- Evaluate planning on a regular base.

It is expected that the coronavirus attack will critically affect for the Sri Lankan textile industry. Explain how you use the above guidelines for developing an aggregate plan as a production manager who is working for the Sri Lankan apparel industry.

[5.0 Marks]

c) Briefly explain the main functions of Master Production schedule

[2.0 Marks]

Q5. a) Briefly Explain the importance of the following for an organization by providing examples.

i) Inventory management

[3.0 Marks]

ii) Manufacturing resource planning

[3.0 Marks]

iii) Supply chain management

[3.0 Marks]

iv) Lean and Six Sigma as a quality management tool

[3.0 Marks]