# UNIVERSITY OF RUHUNA

## FACULTY OF MANAGEMENT AND FINANCE

### Bachelor of Business Administration Degree Programme 2000 Level Semester II Examination (March 2022)

**BBA 22023 – OPERATIONS MANAGEMENT**  **Duration: Three hours**

The question paper contains six (06) questions.

Answer for five (05) questions only.

**Question One**

I. Briefly explain the transformation process with an appropriate example.

(06 Marks)

II. The Maxis Company manufactures tire assemblies. The current process uses 15 workers and produces 300 units per hour. You are considering to change the process with new assembly methods that increase output to 350 units per hour, but will require 17 workers. Particulars are as follows:

|  | Current Process | New Process |
|---|---|---|
| Output (Units / hour) | 300 | 350 |
| Number of workers | 15 | 17 |
| Material cost / hour | Rs: 200 | Rs: 230 |

Workers are paid at a rate of Rs: 10.00 per hour, and overhead charged at 150% (or 1.5 times) labour costs. Finished tire sells for Rs: 200 per unit.

a. Calculate the multifactor productivity for the current process.

(02 Marks)

b. Calculate the multifactor productivity for the new process.

(02 Marks)

c. What is the most appropriate process for the tire manufacturing?

(01 Mark)

III. The XYZ company assembles major four components of solar water heaters with 0.98, 0.96, 0.94, and 0.90 component reliabilities. All of the components must function in order to operate the solar heater efficiently.

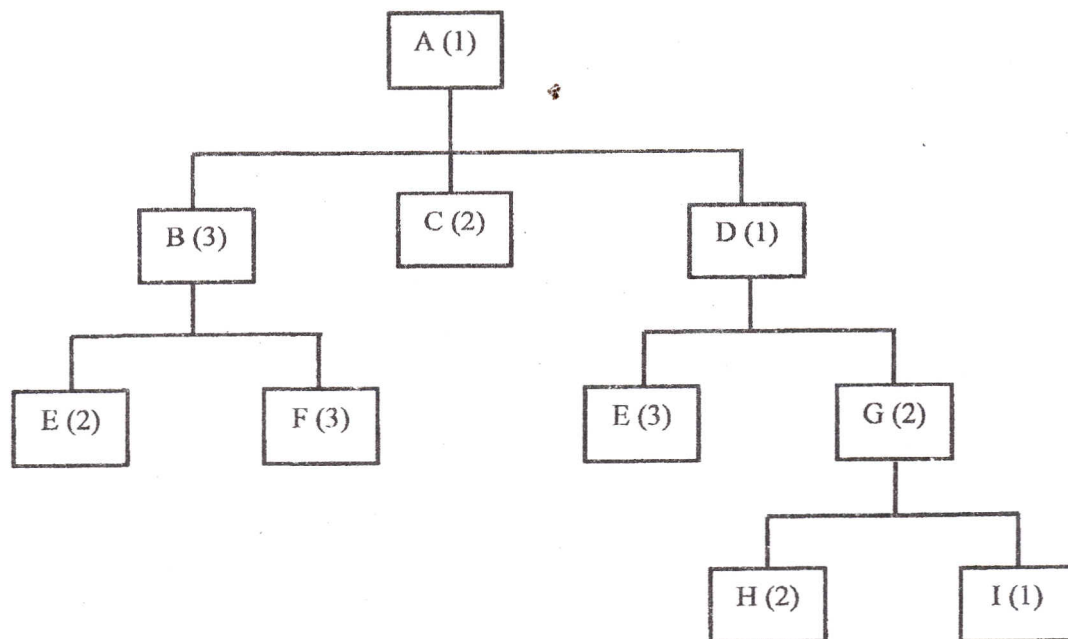Compute the reliability of the solar heater.

(03 Marks)

(Total 14 Marks)

**Question Two**

I. Briefly discuss the capacity options in aggregate planning which can be used to increase or decrease capacity to match current demand.

(04 Marks)

II. The following figure represents the assembly structure of product A (the numbers within the bracket represents quantities per assembly)

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                         ┌───────────┐
                         │   A (1)   │
                         └─────┬─────┘
          ┌────────────────────┼────────────────────┐
     ┌─────────┐          ┌─────────┐          ┌─────────┐
     │  B (3)  │          │  C (2)  │          │  D (1)  │
     └────┬────┘          └─────────┘          └────┬────┘
     ┌────┴────┐                               ┌────┴────┐
┌─────────┐ ┌─────────┐                   ┌─────────┐ ┌─────────┐
│  E (2)  │ │  F (3)  │                   │  E (3)  │ │  G (2)  │
└─────────┘ └─────────┘                   └─────────┘ └────┬────┘
                                                      ┌────┴────┐
                                                 ┌─────────┐ ┌─────────┐
                                                 │  H (2)  │ │  I (1)  │
                                                 └─────────┘ └─────────┘
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The requirement of product A in day 10 is 60 units. The inventory of items and lead times are as follows.

| Item | Quantity on hand | Lead time (days) |
|------|------------------|------------------|
| A | 15 | 1 |
| B | 35 | 2 |
| C | 20 | 3 |
| D | 10 | 1 |
| E | 40 | 3 |
| F | 60 | 2 |
| G | 30 | 2 |
| H | 20 | 1 |
| I | 0 | 1 |

Prepare a material requirement plan (MRP) schedule using lot for lot rule.

(10 Marks)

(Total 14 Marks)

## Question Three

I. Explain how effective product or service design provide competitive edge to an organization.

(06 Marks)

II. The following sales records of year 2021 have been extracted from the King Cone cafe popular for dairy free ice creams.

| Month | Ice cream Sales (Liters) |
|-------|--------------------------|
| January | 1200 |
| February | 2075 |
| March | 1950 |
| April | 2040 |
| May | 2025 |
| June | 3050 |
| July | 4500 |
| August | 3700 |
| September | 1800 |
| October | 2800 |
| November | 4700 |
| December | 1850 |

Compute the expected sales of January 2022 using the linear trend line.

(08 Marks)

(Total 14 Marks)

## Question Four

I. Briefly discuss the quality tools that can be used to identify quality problems and their causes.

(06 Marks)

II. Given in the following table are the tasks necessary for assembly of a shoe, the length of time needed to perform each task, and the operations that must be completed prior to subsequent operations.

| Work Element | Precedence | Time (min) |
|---|---|---|
| A | - | 3 |
| B | A | 3 |
| C | B | 2 |
| D | - | 5 |
| E | D | 1 |
| F | - | 3 |
| G | F | 3 |
| H | C, E, G | 5 |

You are required to,

a. Construct a precedence diagram for the assembly of a shoe.

(02 Marks)

b. Compute the desired cycle time necessary to produce 320 shoes in a 40-hour week.

(02 Marks)

c. What is the minimum number of workstations that can be used on the assembly line?

(01 Mark)

d. Balance the line and calculate its efficiency.

(03 Marks)

(Total 14 Marks)

## Question Five

I. Assume you are an operations manager in a biscuit manufacturing company. You are given the responsibility of taking decisions of locating new manufacturing facility. Explain what factors should be considered when selecting a site for new manufacturing facility.

(06 Marks)

II. The life mobile company plans to set up a new mobile parts unit. The unit will supply parts to three existing mobile assembly units. The grid map coordinates of three locations and the number of units of each are as follows.

| Location | X, Y Coordinates | Number of units per day |
|----------|------------------|-------------------------|
| 1 | 250, 450 | 200 |
| 2 | 480, 300 | 250 |
| 3 | 180,400 | 150 |

The company is considering three sites and coordinates of these sites are A (400,180), B (360,200), C (200,150). You are required to determine the best location using load distance method.

(08 Marks)

(Total 14 Marks)

## Question Six

I. Briefly explain the importance of Lean manufacturing system to achieve competitive advantages.

(06 Marks)

II. Mrs. Silva has five jobs waiting to be processed through a machine. Processing time (in days) and due date information for each job as follows.

| Job | Processing Time | Due Date |
|-----|-----------------|----------|
| P | 6 | 7 |
| Q | 9 | 16 |
| R | 5 | 12 |
| S | 3 | 6 |
| T | 4 | 8 |

a) Schedule the above jobs by using Shortest Processing Time (SPT), and Critical Ratio (CR) rules.

(06 Marks)

b) Calculate mean flow time and mean tardiness for each sequence rule.

(02 Marks)

(Total 14 Marks)

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