AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's future"

COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NMMS 402: PRODUCTION AND OPERATIONS MANAGEMENT

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2021

LECTURER: MR T. NEMAUNGA

TIME: 5 HOURS

INSTRUCTIONS

Answer ALL of the following **QUESTIONS.**

The marks allocated to **each** question are shown at the end of the section.

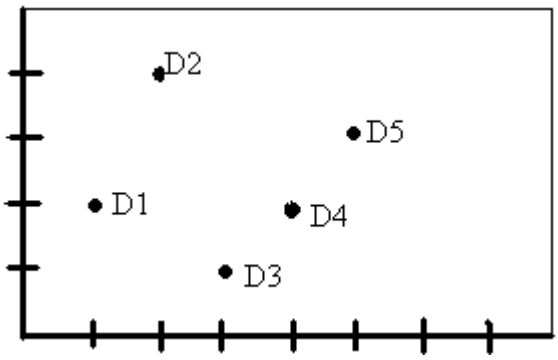
Marks will be awarded for showing all your workings.

Instructions:

Answer **ALL** of the following questions:

1) Answer the following:

a) Determine the center of gravity for the destinations shown on the following map. Monthly shipments will be the quantities listed in the table. [4]



Destination	Quantity
D1	300
D2	200
D3	400
D4	800
D5	250

b) If the quantities to be shipped where uniform, what will be the new destination coordinates?[3]

2) A firm plans to begin production of a new small appliance. The manager must decide whether to purchase the motors for the appliance from a vendor at $8 each or to produce in-house. Either of two processes could be used for in-house production; one would have an annual fixed cost of $160 000 and a variable cost of $5 per unit, and the other would have an annual fixed cost of $210 000 and a variable cost of $4 per unit. Determine the range of annual volume for which each of the alternatives would be best? [5]

3) Africa University wants to increase its capacity by purchasing a new machine. Two options, A and B, have been identified, and the associated costs and revenues have been estimated. Annual fixed costs would be $40 000 for A and $30 000 for B; variable costs per unit would be $10 for A and $11 for B; and revenue per unit would be $15.

   a) Determine each option's break-even point in units? [4]
   b) Draw a simple, sketchy diagram showing the breakeven point for machine-A [4]
   c) At what volume of output would the two options yield the same profit? [4]
   d) If expected annual demand is 12 000 units, which option would be best, based on profit? [4]

4) Compute the total productivity measure for each of the weeks shown. Assume 40-hour weeks and an hourly wage of $10. Overhead is 2 times weekly labor cost. Material cost is $5 per kg. Standard price is $120 per unit. [4]

Week	Output (units)	Workers	Materials (Kg)
1	300	6	45
2	338	7	46
3	322	7	46
4	354	8	48

5) Allied Trucking is considering moving to a new location. After a careful analysis of the possible location alternatives, management came up with the following Factor Rating information:

	weights	**LOCATION**		
Factor		**A**	**B**	**C**
Business services	0.25	9	5	5
Community services	0.1	7	6	7
Real estate cost	0.15	3	8	7
Construction costs	0.2	5	6	5
Cost of Living	0.15	4	7	8
Taxes	0.15	5	5	4

a) Using the information in the table, how would the locations stack up in terms of their composite factor rating scores? [4]

b) If all the factors were equally important to management, how would the locations stack up? [4]

6) In the following examples, determine the **capacity utilization** and the **efficiency** for each of these situations:

a) A loan processing operation that processes an average of 7 loans per day. The operation has a design capacity of 10 loans per day and an effective capacity of 8 loans per day. [3]

b) A furnace repair team that services an average of 4 furnaces a day if the design capacity is 6 furnaces a day and the effective capacity is 5 furnaces a day. [3]

c) Would you say that systems that have higher efficiency ratios than other systems will always have higher utilization ratios than those other systems? Explain.[4]

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