BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF HUMAN RESOURCES MANAGEMENT

HCM201/BS201 Quantitative Analysis for Business II (1)

Duration: 3 HOURS

MAR 2024

INSTRUCTIONS FOR CANDIDATES

1. Answer any **two** questions from section A and any **two** questions from section B.
2. All questions carry equal marks.
3. No unauthorised items must be brought into the examination room.

MATERIALS ALLOWED

1. Scientific Calculator
2. Statistical Booklet
3. Graph Paper

SECTION A: Answer any **two** Questions

QUESTION 1

a) Define the following terms as they are used in inferential statistics

i) Type I Error and Type II error (5)

ii) Level of Significance (5)

b) The customer service department of a local gas utility would like to estimate the average length of time between the entry of the service request and the connection of service. A random sample of 15 houses was selected from the records available during the last year. The results in number of days are as follows:

114	78	96	137	78	103	117	126	86	99	114	72	104	73	86

Required:

Find the 95% confidence interval estimate of the population waiting time (15)

[25]

QUESTION 2

A manufacturer produces two models of racing bike B and C, each of which must be processed through two machine shops. Machine shop 1 is available for 120 hrs per month and machine shop 2 for 180 hrs per month. The manufacturer of each bike of type B takes 6 hrs in shop 1 and 3 hrs shop 2. The corresponding times for C are 4 and 10 hours respectively. If the profit is $180 and $220 per bike respectively.

Required:

i) Formulate the linear programming model which maximizes profit. (5)

ii) Solve this model graphically and determine how many bikes of type B and C are produced in order to maximize profit. (20)

[25]

QUESTION 3

A property analyst is examining the relationship between the City Councils valuation on residential property and the market value (selling prices) of properties. A random sample of 8 recent property transactions was examined. The data is as follows

City Council Valuation	12	45	32	50	28	56	18	40
Market Value	65	220	142	310	196	364	116	260

Required:

i) Find the correlation co-efficient between council valuation and market value (20)

ii) Comment on your results (5)

[25]

Section B: Answer any two Questions

QUESTION 4

Differentiate the following functions:

i) $y = e^{23x} + 2x$ (5)

ii) $y = \ln 20x + 30000$ (5)

iii) $y = xe^{3x}$ (5)

b) The total revenue function of a firm is given as $TR = 26x - x^2$ and its total cost function as $TC = \frac{1}{x} + x^3 + \frac{1}{2}x^2 - 30x + 150$ where x is the output.

Required:

Estimate the maximum profit (15)

[25]

QUESTION 5

A hotels monthly occupancy rate (measured as a percentage of rooms available) is reported as follows:

Months	Year	Occupancy %
Sept	2005	74
October	2005	82
November	2005	70
December	2005	90
January	2006	88
February	2006	74
March	2006	64
April	2006	69
May	2006	58
June	2006	65

Required

i) Fit a least squares trend line to the hotel s occupancy rate. (15)

ii) Estimate the hotel occupancy rate for July 2006 and August 2006. (5)

iii) Comment on your findings. (5)

[25]

QUESTION 6

The following information relates to prices and quantities of blank video tapes sold between 2021 and 2022

Length of Video Tapes	2021		2022	
	Price $	Quantity	Price $	Quantity
30 minutes	30	22	46	30
60 minutes	33	140	51.50	180
90 minutes	36	990	64.00	120

Base year is 2021

Required:

i) Calculate the Lasperyres Quantity Index for 2022. (10)

ii) Calculate the Paasche Quantity Index for 2022 (10)

iii) Calculate the corresponding Fishers Index and Comment. (5)

[25]

End of Paper