BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF HUMAN RESOURCES MANAGEMENT
Course: HCM201/BS201 Quantitative Analysis for Business II (2)
Duration: 3 HOURS

NOV 2023

INSTRUCTIONS FOR CANDIDATES

1. Answer any **two** questions from section A and any **two** questions from section B.

INFORMATION FOR CANDIDATES

1. All questions carry equal marks.
2. 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) A trade union claims that the mean hourly rate paid to workers throughout the country is $285. A research company wishes to test this claim. The company conducted a survey with a sample of 250 workers. The results revealed a mean hourly rate of $303 and a standard deviation of $100. Test the hypothesis at 5% level of significance that the mean hourly rate paid to workers throughout the country is $285. (10)

b) The shelf life of a beverage is of interest. Ten bottles are randomly selected and tested and the following results are obtained:

108 124 124 100 115 138 163 159 134 139

Assume that the alternate hypothesis is that the mean shelf life is greater than 125 days. Can the null hypothesis be rejected at 5% level of significance? (15)

[25]

QUESTION 2

AB (Pvt) Ltd makes chairs and tables among other products. The company can realize a profit of $50 on each chair and $100 on each table. Each chair requires 1 hour on the machine and 2 hours of skilled labour. Each table requires 3 hours on the machine and 1 hour of skilled labour. The company has a maximum of 9 hours of machine time available and a maximum of 8 hours of skilled labour available.

i) Formulate a linear programming model to maximize profit. (5)

ii) Solve graphically and estimate the maximum profit. (20)

[25]

QUESTION 3

The training manager of a company that assembles and exports pool pumps wants to know if there is a link between the number of hours spent by assembly workers in training and their productivity on the job. A random sample of 10 assembly workers was selected and their performances evaluated and shown in the table below:

Training Hours	20	36	20	38	40	33	32	28	40	24
Output	40	70	44	56	60	48	62	54	63	38

(i) Construct a scatter diagram and comment (5)

(ii) Calculate the regression line, using the least squares method, to identify a linear relationship between the hours of training received by assembly workers and their output. (10)

(iii) Calculate the coefficient of determination between training hours received and worker output. Interpret its meaning and advise the training manager. (5)

(iv) Estimate the average daily output of an assembly worker who has received only 25 hours of training. (5)

[25]

Section B: Answer any two Questions

QUESTION 4

a) Differentiate the following functions:

i) $y = \frac{x(x+1)}{(2x^2+3)}$ (5)

ii) $y = x^3 \ln(2x+5)$ (5)

b) A production process has a cost function by: $TC = 28x^2 + 200$ and a revenue function given by $TR = 600x - 2x^2$

i) Derive the profit function (5)

ii) How many units should be produced in order to maximize profit (5)

iii) Determine the maximum amount of profit (5)

[25]

QUESTION 5

The quarterly demand levels for electricity in Bindura for the years 1998 to 2000 in thousands of Kilowatts are as follows:

Years	Quarter			
	I	II	III	IV
1998	28	31	40	27
1999	32	38	49	38
2000	47	47	55	41

Required

i) Find the seasonal index for each quarter. (15)

ii) Deseasonalize your time series and interpret your findings. (10)

[25]

QUESTION 6

The following are prices in dollars and quantities of six food items consumed by a typical family in 2013 and 2014

Item	Price($) (2013)	Quantity in Units (2013)	Price($) (2014)	Quantity in Units (2014)
Bread	0.87	50	1.28	55
Rice	1.05	26	2.17	20
Eggs (Dozen)	1.05	102	3.87	130
Milk(500ml)	2.94	30	1.16	40
Sugar	0.86	40	2.54	41
Coffee	3.43	12	3.68	12

Using year 2013 as base year, calculate:

i) Laspeyres Quantity Index for 2014. (10)

ii) Paasche Quantity Index for 2014. (10)

iii) Fishers ideal index for 2014 and comment on your results. (5)

[25]

End of Paper