

THE OPEN UNIVERSITY OF SRI LANKA
 FACULTY OF MANAGEMENT STUDIES
 BACHELOR OF MANAGEMENT STUDIES (HONOURS) DEGREE
 PROGRAMME - LEVEL 3
 ACADEMIC YEAR: 2022/23
 OSU3507 - QUANTITATIVE TECHNIQUES FOR MANAGEMENT I
 ASSIGNMENT TEST
 DURATION: TWO HOURS



DATE: 06.01.2023

TIME: 1.30 PM – 3.30 PM

Instructions:

Answer **FOUR** questions **ONLY**.

All questions carry equal marks.

Non-programmable calculators are allowed.

This question paper carries 5 questions in 5 pages.

Question 1

- i. 8 wooden poles are used for pillars and length of the pillars are from an arithmetic progression if the second pole is 2 meters and the sixth pole in order 5 meters, find the different between the sixth pole and seventh pole. Calculate the total length of 8 wooden poles. (10 marks)
- ii. Each year, a person earns a salary that is 2 percent higher than his previous year's salary. In the first 5 years at this job, this person earned a total of Rs. 1,550,000/-. What was the salary in the 1st year at this job? Calculate 5th year salary. (Hint: Use the knowledge of progressions) (7 marks)
- iii. With suitable examples, describe each of the following terms related to Statistics.
 - a) Population
 - b) Sample
 - c) Primary data
 - d) Secondary data
 (8 marks)

(Total 25 marks)

Question 2

- i. In an arithmetic progression, the 6th term is 13. If the sum of the first 10 terms of the progression is 110, find the first value and the difference. (6 marks)

- ii. In a geometric progression, the sum of the first 2 terms is 6 and the sum of the 3rd and the 4th terms is 24. Find the starting value and the common ratio. (6 marks)
- iii. Simplify the following expression.
 $2t - [(a + b)^2 - t] - [2a^2 + 2b^2]$ (4 marks)
- iv. A company is evaluating 2 investments (A and B) and their cash flows are given in the table below:

Plan	Investment	1 st year	2 nd year	3 rd year
A	(15000)	6000	8000	9000
B	(20000)	7000	10000	14000

Evaluate the most profitable investment by calculating the net present values. Use the discount rate of 10%. (9 marks)

(Total 25 marks)

Question 3

A company wishes to evaluate the printing quality of 150 books. The company wishes to study a sample of 50. There are 4 categories of products and the number of products in each category are as follows:

- Book A.....39
- Book B.....46
- Book C.....30
- Book D.....35

- i. Explain how you can pick a random sample of 50 products. (3 marks)
- ii. Explain how you can pick a stratified sample of 50 products. (8 marks)
- iii. Explain how you can pick a systematic sample of 50 products. (4 marks)

The values for the sample of 50 obtained for the above scenario are listed below:

120	50	96	51	53	75	48	79	27	112
106	107	43	22	17	28	138	25	64	141
126	69	120	25	70	146	113	144	135	9
121	148	9	144	99	121	119	117	132	130
70	124	104	18	70	119	77	124	10	65

- iv. Construct the following for the above data.
- a) Frequency Distribution Table (Consider the equal size class intervals as 0 upto 30, 30 upto 60 etc) (5 marks)
 - b) Histogram (3 marks)
 - c) Frequency Polygon (2 marks)
- (Total 25 marks)**

Question 4

Estimate the following measures for the frequency distribution table given below.

Amount of milk collected per day (liters)	Number of days
200-300	1
300-400	2
400-500	4
500-600	6
600-700	8
700-800	5
800-900	2
900-1000	2

- ii. Mean (5 marks)
- iii. Median (7 marks)
- iv. Mode (2 marks)
- v. First quartile (2 marks)
- vi. Third quartile (2 marks)
- vii. Range (1 mark)
- viii. Inter Quartile Range (1 mark)
- ix. Variance (5 marks)

(Total 25 marks)

Question 5

An agriculture company wants to analyse the change in prices and average weekly demand quantities of harvest from 5 different crops that can be used for exporting. The data collected are given in the table below.

Crop	2019		2020		2021	
	Price per kg (Rs.)	Quantity (kg)	Price per kg (Rs.)	Quantity (kg)	Price per kg (Rs.)	Quantity (kg)
A	450	95	480	108	560	130
B	260	60	300	75	350	80
C	350	75	415	70	560	85
D	250	110	280	120	350	125
E	530	82	650	95	700	115

- i. Compute the simple quantity index for 2021 for the 5 crops taking year 2019 as the base year. (5 marks)
- ii. Compute simple aggregate price index for 2020 and 2021, taking year 2019 as the base year. (4 marks)
- iii. Compute simple aggregate quantity index for 2021, taking year 2019 as the base year. (3 marks)
- iv. Compute the Laspeyres price index for 2020 and 2021, taking year 2019 as the base year. (4 marks)
- v. Compute the Paasche price index for 2020 and 2021, taking year 2019 as the base year. (4 marks)
- vi. Compute Fisher's price index for 2020 and 2021, taking year 2019 as the base year. (2 marks)
- vii. Consider the answers obtained for part (vi). If the base year changes to 2021, calculate the new index numbers for 2019, 2020 and 2021. (3 marks)

(Total 25 marks)

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Formulae

$$\text{mean} = \bar{x} = \frac{\sum fx}{\sum f}$$

$$\text{Median} = L + \frac{\frac{n}{2} - F}{f} \cdot c$$

$$\text{Mode} = L + \frac{d_1}{d_1 + d_2} \cdot c$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(1 - r^n)}{(1 - r)}$$

$$A = p(1 + i)^n$$

$$A = p \left(1 + \frac{i}{f}\right)^{nf} \quad A = p \left(1 + \frac{i}{f}\right)^{nf}$$

$$i' = \left(1 + \frac{i}{f}\right)^f - 1$$

$$PV = \frac{A}{(1 + i)^n}$$

$$\text{(Simple Price Index)} = \frac{P_n}{P_0} \cdot 100 \quad \frac{P_n}{P_0} \cdot 100$$

$$\text{Simple Aggregate Price Index} = \frac{\sum P_n}{\sum P_0} \cdot 100 \quad \frac{\sum P_n}{\sum P_0} \cdot 100$$

$$\text{Weighted Aggregate Price Index} = \frac{\sum P_n Q_x}{\sum P_0 Q_x} \cdot 100 \quad \frac{\sum P_n Q_x}{\sum P_0 Q_x} \cdot 100 ;$$

(When $x=0$ - Laspeyre's index, When $x=n$ - Paasche's index)

$$\text{Fisher's Price Index} = \sqrt{\frac{\sum P_n Q_0}{\sum P_0 Q_0} \cdot \frac{\sum P_n Q_n}{\sum P_0 Q_n} \cdot 100} \quad \sqrt{\frac{\sum P_n Q_0}{\sum P_0 Q_0} \cdot \frac{\sum P_n Q_n}{\sum P_0 Q_n} \cdot 100}$$

