**FUNDAMENTALS OF BUSINESS STATISTICS SUGGESTED SOLUTIONS**

**SECTION A (40 MARKS)**

1. C
2. B
3. A
4. A
5. D
6. B
7. C
8. C
9. A
10. A
11. D
12. B
13. A
14. C
15. D
16. C
17. C
18. A
19. B
20. D

**SECTION B (60 MARKS)**

**QUESTION 2**

1. Listing of the levels of measurement
2. Nominal scale – eg  gender, nationality, ethnicity, language, genre, style, biological species, **A2**
3. Ordinal scale – eg top 5 cities, **A2**
4. Interval scale – eg *temperature* with the Celsius scale, **A2**
5. Ratio scale – eg mass, length, duration, **A2**
6. ‘Independent events’ are events in which the occurrence of one event does not affect the probability of occurrence of the other event. Eg the arrivals of customers at an ATM are independent events. [or a die and a coin are tossed: getting an even number on the die and a head on the coin are indfependent events], **A2**

‘Mutually exclusive events are events that cannot happen at the same time or have nothing in common. Eg Tossing a die, then events ‘rolling an even number’ and ‘rolling an odd number’ are mutually exclusive events. **A2**

1. i) P(respondent disagrees with the statement) = , **M1**, **A1**

ii) P(disagrees with the statement and is in the 25 to 44 age group)

= P(disagrees with the statement  25 to 44 age group) = 

iii) P(disagrees with the statement or is in the 25 to 44 age group)

= P(disagrees)+P( 25 to 44 age group) –P(disagrees25 to 44 age grp), **M1**

= , **M2**, **A1**

**(Total 20 marks)**

**QUESTION 3**

a) Qualitative data are data that consists of categories or types of a characteristic or attribute while quantitative data are data that can be expressed numerically. **A2**

Examples: Qualitative – Transaction type or account type, **A1**

Quantitative – Number of customers, **A1**

b) i) No. of customers Tally marks Frequency

0 – 19 ||||| ||||| | 11

20 – 39 ||||| 5

40 – 59 |||| 4

60 – 79 ||| 3

80 – 99 | 1

**M2 M1 A1**

ii) Histogram

Labelled axes (**M2**), correct vertical bars (**A2**).

1. Calculation of summary measures:
2. Mean

No. of customers Freq (f) Mid value (x) fx 

0 – 19 11 9.5 104.5 992.75

20 – 39 5 29.5 147.5 4,351.25

40 – 59 4 49.5 198 9801

60 – 79 3 69.5 208.5 14,490.75

80 – 99 1 89.5 89.5 8,010.25

Sum **748**  **37,646**

**M1 M1 M2**

Hence mean is , to the nearest whole number. **M1**, **A1**

II. Standard deviation = 

=  = 39.2 to 1D, **M1**, **A1**

**(Total 20 marks)**

**QUESTION 4**

1. The independent variable is the variable that influences the outcome of the other variable and its value is usually known or can be manipulated while a dependent variable is a variable whose outcome is influenced by the independent variable. **A2**

Example: Advertising expenditure and sales volumes. Advertising expenditure is an independent variable while sales volume is a dependent variable. **A2**

b) i) Telephone interview: this involves a researcher calling respondents to gather data about some phenomenon. **A2**

*Advantage*:it is less time consuming since responses are instant. **A1**

*Disadvantage*: The sample may be biased since it excludes people without phones. **A1**

ii) Questionnaires: questionnaires refer to forms filled in by respondents alone. They usually contain sets of questions with options that are selected by respondents. Questionnaires can be handed out or sent by mail and later collected or returned by stamped addressed envelope. **A2**

*Advantage*: Potentially data can be collected from a large portion of the population i.e. has a wider reach. **A1**

*Disadvantage*: Low response rate as some respondents may not return the filled questionnaires. **A1**

c) i) Stem and leaf display

|  |  |
| --- | --- |
| 5  6  7  8 | 7 8  4 4 5 8 8  0 0 1 1 2 2 5 5 5 5 6 8  0 2 3 3 5 |

Correct stem **(M1),** correct leaf **(A3)**

ii) Mode = 75, **A1**

iii) Median =  = item, **M1**

i.e. , **M1**, **A1**

**(Total 20 marks)**

**QUESTION 5**

a) Scatter diagram

Labelled axes (**A1**), Correct scale (**A1**), Accurate plotted points (**A2**)

b) i) Least squares regression line: , where  and .

, , , , , **M2**

Then  = = 1.1919, **M2**

= = 14.557, **M2**

So  = , **A1**

ii) The line can be used to predict future sales i.e. make forecasts or used to investigate linear relationships between variables. **A2**

c) Product moment correlation coefficient is



Now , **M1**

**Then r**  = , **M2**

= 0.907, **A1**

c) Coefficient of determination is , **M1**, **A1**

Interpretation: The coefficient of determination of 82.3% implies that 82.3% of the variability observed in sales can be explained by the number of calls made. **A1**

**(Total 20 marks)**

**QUESTION 6**

1. i) Geometric mean. This would be appropriate because inflation rates are not really independent of each other. It most appropriate when evaluating ratios and percentages. **A2**
2. Using Geometric mean, **M1**

then

GM = , **M2**

= 0.1000 = 10%, **A1**

b) i) A pie chart is appropriate for data with fewer categories or single item form of data. In this case there are four centres and four years, hence there are too may categories. **A2**

ii) 2017 data: Total = 70 + 45 + 35 + 60 = 210, **M1**

Slices: Centre 1: , Centre 2: , **M1**

Centre 3: , Centre 3: , **M1**

Pie chart:

Circle of radius 5 cm (**A1**), accurate slices (**A1**) and correct labelling (**A1**)

1. Multiple bar chart.

Labelled major and minor axes (**A3**), correct vertical bars (**A3**).

**(Total 20 marks)**