ANSWER 5 OUT OF 7 QUESTIONS (20 MARKS EACH)

1. a. Indicate whether the following variables are:

- Qualitative or quantitative data (classify the quantitative variables as discrete or continuous)
- Nominal, ordinal, interval or ratio level of measurement

(i) Number of TVs owned by families

(ii) Colour of eyes

(iii) Weight of potatoes

(iv) Grades of Statistics module

(8 marks)

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b. A car dealer wants to study the relationship between the age of a car (in years) and its selling price (in $'000). A random sample of 6 used cars sold last year gives the following information.

Age of Car	7	12	8	6	10	11
Selling Price	10	4	5	8	6	6

(i) If the dealer wants to estimate selling price on the basis of the age of the car, which variable is the dependent variable and which is the independent variable.

(2 marks)

(ii) Find the line of best fit. (9 marks)

(iii) Forecast the selling price of a 9-year old car. (1 mark)

2. a. List and describe **three** probability sampling techniques commonly used.
(9 marks)

b. David Wong handles his own investment portfolio, and has done so for many years. The data below show the holding time (recorded to the nearest whole year) between purchase and sale for his collection of stocks.

8	8	6	11
8	5	11	4
5	14	7	12
6	11	9	7
11	8	8	9

(i) Construct a frequency distribution with 6 classes and an initial class limit of '4 – 5'. Include the class limits, class boundaries, class midpoint, frequency, relative frequency, cumulative frequency and cumulative relative frequency in the table.

(ii) Describe the essential elements of the frequency distribution.

(11 marks)

3. a. A shop owner would like to know the number of *Cosio* printers sold at his shop for the past weeks. He has collected the sales data for the past 50 days.

Number of units sold	Frequency
0	4
1	12
2	18
3	10
4	6
Total	50

(i) What is the probability that more than one printer is sold in a given day? (2 marks)

(ii) What is the probability that no printer is sold in a given day? (2 marks)

b. A family has 3 children. Find the following probability.

(i) All children are boys (2 marks)

(ii) Exactly one boy and two girls (2 marks)

(iii) At least one girl (2 marks)

c. A company claims that the volume of his drinks is on average 200 ml per bottle. The distribution of the volume is known to be normal. A random sample of 25 bottles gives a mean of 198 ml with a standard deviation of 10 ml.

At 5% level of significance, test that the mean volume is less than 200ml.

(10 marks)

4. a. A manager of a soft drink company believed that 90% of the drinks produced contain 250 ml or more. A sample of 10 bottles is observed.

(i) What is the probability that exactly 8 of the bottles contain 250 ml or more? Express the probabilities in 3 decimal places.

(3 marks)

(ii) What is the probability that 9 or more bottles contain 250 ml or more? Express the probabilities in 3 decimal places.

(5 marks)

(iii) What is the mean and standard deviation of this distribution?

(4 marks)

b. A study on the relationship between the size of a house and its selling price gives a Pearson's correlation coefficient of 0.72.

(i) What does the value of the Pearson's correlation coefficient tell you about the relationship between the size of a house and its selling price?

(3 marks)

(ii) Calculate the coefficient of determination. What does this tell you?

(5 marks)

5. a. One business school recently surveyed its students on their response toward a possible policy, that all college students be required to own a laptop computer. The responses are given in the table below along with students' majors.

Major	Response: Laptop required?	
	Yes	No
Accounting	68	42
Finance	40	15
Management	60	50
Marketing	30	25

At 5% level of significance, do the data indicate that there is an association between one's major and the response to the policy?

(8 marks)

b. It is known that amounts of money spent on grocery in a week by students follow a normal distribution with a mean of $120 and a standard deviation of $30.
(Express the probabilities in 4 decimal places.)

(i) What is the probability that a randomly chosen student will spend less than $132 on grocery in a week?

(4 marks)

(ii) What is the probability that 36 randomly chosen students will spend an average of more than $108 on grocery in a week?

(4 marks)

(iii) What is the probability that 36 randomly chosen student will spend between an average of $108 and $132 on grocery in a week?

(4 marks)

6. a. A sample is randomly selected from a population of a city. The data below shows the age and gender of the sample.

Age	Gender	
	Male	Female
Over 55	90	85
Under 55	150	175

Find the probability, in decimal, that a randomly selected person from the city:

(i) is a male? (2 marks)
(ii) is over 55 years of age? (2 marks)
(iii) is a male and under 55 years of age? (2 marks)
(iv) is a male or over 55 years of age? (2 marks)
(v) Are the events “a male” and “over 55 years of age” mutually exclusive? (2 marks)

b. A random sample of 64 supervisors at a company revealed that, on average, they spent 6 years on the job before being promoted. The population standard deviation was 2 years.

(i) What is the point estimate of the population mean?

(1 mark)

(ii) Develop a 95% confidence interval for the population mean.

(4 marks)

(iii) Interpret the confidence interval obtained in part (ii).

(2 marks)

(iv) Explain the change to the interval if the confidence level is increased to 99%.

(3 marks)

7. a. The score for 6 randomly selected games is listed below:

20 15 13 26 18 22

Calculate the following:

(i) Mean (2 marks)
(ii) Median (2 marks)
(iii) Mode (1 mark)
(iv) Range (1 mark)
(v) Standard deviation (4 marks)

b. The waiting time for customers at a new restaurant follows a normal distribution with a population standard deviation of 1 minute. The quality assurance department sampled 30 customers and found that the mean waiting time was 3.4 minutes.

At 5% significance level, can we conclude that the mean waiting time is more than 3 minutes?

(10 marks)

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END OF PAPER