BMGT E2045 – Statistics for Management

No. of Questions: Seven (07)   Time: 03 hours

Answer any five (05) Questions.

Question No. 01

a.   "Business statistic is a subject which the different types of organizations can apply in making their decisions." Comment on the statement.

(05 Marks)

b.   "Primary data sources are more reliable than secondary data sources". Do you agree with this statement? Justify your answer.

(05 Marks)

c.   Explain the two main branches of statistics.

(05 Marks)

d.   State whether each variable given below is qualitative or quantitative.

      i.   Temperature

     ii.   Language

    iii.   Volume of water

    iv.   Monthly electric bill (Rupee value)

     v.   Colour of bags in the shop

(05 Marks)

(Total 20 Marks)

Question No. 02

a.   i.   Calculate the Median, Standard deviation, Range and Interquartile range for the following number set.

5,1, 7, 5,5,20,8

ii.   Comment briefly on the different measures that you calculated in part (i) you calculated.

iii.   Which is more useful from the above-calculated measures to a decision maker? Give reasons for your answer.

(12 Marks)

b.   Two workers on the same job show the following results over a long period of time.

	Worker A	Worker B
Mean time of completing the job (minutes)	30	25
Standard deviation (minutes)	6	4

i .   Which worker appears to be more consistent in the time he requires to complete the job? Explain.

ii.   Which worker appears to be faster in completing the job? Explain.

(04 Marks)

c.   What are the general rules for the graphic presentation of data and information?

(04 Marks)

(Total 20 Marks)

2

Question No. 03

A university research centre investigated the students' preferences for the method of learning. A simple random sample of 730 students from all four levels was taken for a study. Each student was given the statement "I prefer the physical method of learning to online" and asked whether they strongly agreed, agreed, had no opinion, disagreed, or strongly disagreed. The following contingency table summarizes the results.

Level	Strongly agree	Agree	Had no opinion	Disagree	Strongly disagree	Total
Year 1	...(i)...	37	11	92	49	212
Year 2	35	28	..(ii)...	59	28	175
Year 3	36	32	39	43	...(iv)....	190
Year 4	48	38	22	...(iii)...	14	153
Total	142	135	97	225	131	730

a. Calculate the missing values in the table {(i), (ii), (iii), and (iv) }.

(04 Marks)

b. i. What is the marginal probability that those students have had 'no opinion' answer?

ii. What is the interpretation of this marginal probability?

(04 Marks)

c. i. Identify a joint event from this table and compute its probability.

ii. Interpret your answer.

(04 Marks)

d. i. Identify a event of conditional probability from the table and compute its probability.

ii. What is the interpretation of your identified conditional probability?

(04 Marks)

e. i.   What is the conditional probability that a student was a year 2   given he/she strongly agreed with this statement.

    ii. Interpret your answer.

(04 Marks)

(Total 20 Marks)

Question No. 04

a.   What is meant by a probability distribution?

(02 Marks)

b.   Explain in what situations binomial distribution is most appropriate to apply with an example.

(02 Marks)

c.   State four (4) characteristics of a normal distribution.

(04 Marks)

d.   A monthly family expenditure of 421 families in the Gampaha district is normally distributed with a mean of Rs. 80,000 and a standard deviation of Rs. 7500.

   i.   If a family of the district is selected randomly, what is the probability that a monthly expenditure is greater than Rs. 60000?

   ii. Determine the percentage and number of families who will be spent between Rs.   65000 and 84000 monthly.

   iii. The government wants to identify families that are in the lowest 10% of expenditure in the district to provide a grant. Determine the highest monthly expenditure of a family to obtain the Government grant.

(12 Marks)

(Total 20 Marks)

Question No. 05

a.   What is the main purpose of inferential statistics?

(04 Marks)

b.   An assembly line does a quality check by sampling 50 of its products from a company. Suppose you find that 16% of the items are defective. Based on this, answer the following questions.

i. What is the sample size?

ii. What is the sample proportion?

iii. What is the margin of error?

iv. Find the 95% confidence intervals for the proportion of defective items.

v. How could the company decrease the margin of error? Explain.

(08 Marks)

c.   A researcher is concerned about the impact of students' extra work on their spending time in classes, and he would like to know if students have a high extra work and therefore are spending less time on their classes than they should be. A survey of 200 students provides a sample mean of 7.10 hours extra worked per week., and the standard deviation of this variable is about 5 hours.

i.   Construct a 95% confidence interval based on this sample?

ii. Interpret your answer.

(08 Marks)

(Total 20 Marks)

Question No. 06

a.   A department store manager determines that a new billing system will be cost-effective only if the mean monthly account is *more than* Rs 1 million. The accounts are approximately normally distributed.

i.   Develop the hypotheses related to this situation?

ii. The manager calculated the p-value to test the hypothesis, which was 0.03. At the 5% significance level, can you reject or fail to reject your null hypothesis?

iii. Interpret the given p-value in your own words.

iv. What is your conclusion for the given scenario?

(08 Marks)

5

(b) A popular mobile phone provider claims that 70% of their customers are satisfied with the service provided by them. A consumer agency decides to investigate the claim at a significance level of 0.05. They surveyed 900 of the mobile company's customers and found that 650 people said they were satisfied.

    i.   Define the parameters of interest and give the appropriate hypotheses for this situation.

    ii.   State appropriate test statistic. Show work by giving the correct formula with correct values substituted in the formula.

    iii.   Find the appropriate critical value and rejected region for this hypothesis testing. Draw an appropriate picture and show your work.

    iv.   Write a conclusion for this test in the context of this situation.

(12 Marks)

(Total 20 Marks)

Question No. 07

Nimal, owner of a business unit, is concerned about the sales pattern of his product. He realizes that many factors might help explain sales but believes price and advertising are major determinants. He collected the following data.

Sales (unit sold)	100	90	80	68	67	48	70	45	95	55
Advertisement (No .of ads.)	10	8	8	6	6	4	7	4	9	4
Price (Rs per unit)	150	170	175	200	200	250	180	230	165	220

You are given the following regression (excel) output. You are required to answer the questions based on this output.

a.   Write down the estimated regression equation and interpret the estimated coefficients.

(05 Marks)

Regression Statistics	
Multiple R	0.979523
R Square	0.959465
Adjusted R Square	0.947884
Standard Error	4.397575
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	2	3204.229	1602.115	82.84515	.0000134
Residual	7	135.3707	19.33867		
Total	9	3339.6			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	44.37009	50.63295	0.876309	0.409924	-75.3578	164.098
Advertisement (Number)	7.214165	2.569993	2.807076	0.026256	1.137097	13.29123
Price (Rs per unit)	-0.10404	0.175523	-0.59274	0.571999	-0.51908	0.311006

b.   What does the model predict for sales in the business unit with 12 advertisements and a unit price of Rs. 125.

(05 Marks)

c.   What is the interpretation of R^2 ?

(05 Marks)

d.   How would you describe the evidence for a relationship between sales and two predictor variables?

(05 Marks)

(Total 20 Marks)