University of Kelaniya - Sri Lanka

Centre for Distance and Continuing Education

Faculty of Commerce & Management Studies

Bachelor of Business Management (General) Degree Second Examination (External) – 2014

September - 2017

BMGT E2045 – Statistics for Management

No of questions – Eight (08) Time: 03 Hours

Answer any five (05) questions.

Statistical tables are provided.

(01) a) i. What is Statistics? Define.

ii. Identify and explain the characters of statistics.

(04 marks)

b) "There is a role of statistics in other disciplines". What is it?

(04 marks)

c) Write down two methods of collecting primary data and state two advantages and disadvantages of each.

(04 marks)

d) Indicate the most appropriate type of graph to use in each of the following.

I. You want to show how the total undergraduate enrollment at University of Kelaniya is divided among Arts, Sciences, Commerce and Music majors.

II. You want to show the trend in the number of cases of nuclear experiments in selected countries reported worldwide.

III. Manori has data on the mean, December temperature in Colombo city for the past five (05) years. She wants to draw a graph that will display the trend in data.

IV. Kalhara has data on imported quantity and local production quantity of sugar industry in metric tons for last ten (10) years . He wants to draw a graph that will display the comparison for each year.

(04 marks)

e) *"There is no any difference between descriptive statistics and inferential statistics."*

Do you agree with this statement? Give reasons for your answer.

(04 marks)

(Total 20 Marks)

(02) a) What is grouped data? Explain by using an appropriate example.

(04 marks)

b) What can you conclude about following each distribution of data. State with diagrams.

i. When the mean is greater than median and mode for a data set.

ii. When mode is greater than median for a data set.

(04 marks)

c) Following table shows the information of the retail shops and their earning profits.

If the arithmetic mean of the data given below is 28.

Profit per retail (Rs' 000) shop	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of retail shops	12	18	27	-	17	6

Find ,

i. the frequency when profit is Rs. 30000 - 40000.

ii. the median and mode of the distribution.

iii. 85^{th} percentile.

iv. highest profit of lowest 50% shops.

v. minimum profit earned by the top 25% shops.

vi. maximum profit earned by lowest 25% shops.

(02 marks for each = 12 Marks)

(Total 20 Marks)

(03) a) What are the approaches to defining probabilities? Briefly explain them.

(04 marks)

b) i) What is mutually exclusive events?

ii) From the following events judge the pair of mutually exclusive or not mutually exclusive events. Justify your answer.

- Drawing a "King" or an "Ace" from a deck of cards.
- Getting a number multiple of 3 and divisible by 2 when a dice is thrown.

(04 marks)

c) A certain disease affects about 1 out of 10,000 people. There is a test to check whether the person has the disease. The test is quite accurate. In particular, you know that,

- the probability that the test result is positive (suggesting the person has the disease), given that the person does not have the disease, is 2 percent (2%);
- the probability that the test result is negative (suggesting the person does not have the disease), given that the person has the disease, 1 percent (1%).

A random person gets tested for the disease and the result comes back positive. What is the probability that the person has the disease?

(04 marks)

d) A company produces, 1000 refrigerators a week at three plants. Plant A produces 350 refrigerators a week, Plant B produces 250 refrigerators a week and plant C produces 400 refrigerators a week.

Production records indicate that 5% of the refrigerators at plant A will be defective, 3% of those produced at plant B will be defective, and 7% of those produced at plant C will be defective. All refrigerators are shipped to a central ware house. If a refrigerator at the warehouse is found to be defective, what is the probability that it was produced at plant B?

(04 marks)

e) Bettors in the State Lottery can select three numbers out of ten. They win if all three numbers are correct. If you buy one ticket in the State Lottery, what is your probability of winning?

(04 marks)

(Total 20 Marks)

(04) a) The weights in grams, of the contents of tins of mackeral are normally distributed with mean μ and standard deviation (σ) 2.5.

i. Find the proportion of tins with contents, weighing between 125.0 grams and 130.0 grams when $\mu = 129.0$ grams.

(05 marks)

ii. Find the proportion of tins with contents weighing between 125.0 grams and 130.0 grams when μ is equal to the 127.5 grams.

(05 marks)

iii. Find the value of μ such that 99% of the tins have contents weighing more than 125.0 grams.

(02 marks)

iv. The normal distribution provides a good model for many continuous distributions which arise in production processes. Explain why the Central Limit Theorem provides another reason for the importance of the normal distribution.

(02 marks)

b) Past records show that the time in seconds, taken to run 100 meters by children at a school can be modeled by a normal distribution with a mean of 16.12 seconds and standard deviation of 1.60 seconds. On sports day the school awards certificates to the fastest 30% of the children in the 100 meters race.
Estimate, the slowest time taken to run 100 meters for which a child will be awarded a certificate.

(06 marks)

(Total 20 Marks)

(05) The following table gives information on ages and cholesterol levels for a random sample of 10 men.

Age (years)	58	69	43	39	63	52	47	31	74	36
Cholesterol level	189	235	193	177	154	191	213	165	198	181

Regression output for above data

Regression Statistics	
Multiple R	0.40843093
R Square	0.16681583
Adjusted R Square	0.0626678
Standard Error	22.3549517
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	800.449061	800.449	1.60172	0.2412728
Residual	8	3997.95094	499.744		
Total	9	4798.4			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*
Intercept	156.329183	27.2226757	5.74261	0.00043	93.553581	219.10479	93.5535806
Age	0.64982064	0.51345263	1.26559	0.24127	-0.5342033	1.8338445	-0.5342033

Answer the following questions.

i. Does the age depend on the Cholesterol level or Cholesterol level depend on the age?

ii. What is the regression equation?

iii. What can you conclude about the estimated intercept of part ii ?

iv. What is the interpretation of the slop of regression line?

v. What is R^2 value?

vi. What is the interpretation of R^2 ?

vii. Predict the cholesterol level of a 60 years old man.

viii. What are the 95% confidence intervals for independent variable?

ix. To test the null hypothesis that the parameter of the slope is zero, what is test statistic value?

x. What would be the change in the estimated mean age for each one standard deviation increase in Cholesterol level?

(2 x 10 = 20 Marks)

(06) The company XYZ advertises that 95% of its online orders ship within two working days. You select a random sample of 200 of the 10,000 orders received over the past month to audit. The audit reveals that 180 of these orders shipped on time.

a) What is the sample proportion of orders shipped on time?

(04 marks)

b) Does the sample data satisfy conditions necessary for the sample proportion to follow an approximately normal distribution?

(04 marks)

c) What is the mean and standard error (SE) of the sample distribution assuming normal?

(04 marks)

d) If XYZ really ships 95% of its orders on time, what is the probability that the proportion in a random sample of 200 orders is as small or smaller as the proportion in the audit ?

(04 marks)

e) If we treated the problem as a binomial, how would the problem be set up?

(04 marks)

(Total 20 Marks)

(07) a) A bottling company uses a machine to fill the bottles with Olive oil. The bottles are designed to contain 475 milliliters (ml). In fact, the contents vary according to a normal distribution with a mean of 473 ml and standard deviation of 3 ml.
In a distribution of six randomly selected bottles:

i) What is the mean, and standard error of the sample mean?

ii) What is the probability that the mean of six bottles is less than 470 ml?

iii) What is the probability that the mean of six bottles is more than 475 ml?

(10 marks)

b) The hypothesis $H_0 : \mu = 15$ is to be tested against $H_A : \mu \neq 15$ with $\alpha = 0.05$. A random sample results in:

$n = 20, X = 17.5, S = 5.9$

i. Which distribution should be used? Why?

ii. What is the P-value?

iii. What is your conclusion regarding the null hypothesis?

(10 marks)

(Total 20 Marks)

(08) The Department of Transportation in a certain country did a study a number of years ago that showed that the proportion of cars tested which failed to meet the state pollution standard was 37%. The department would like to be able to say that the cars have improved since then. In a sample of n = 100 cars more recently, the proportion not meeting the standards was 28%. Are the cars better at meeting the standards than they used to be?

(Hint ; Clearly state the null and alternative hypotheses, Perform the hypothesis test at level $\alpha = 0.01$, both by computing the test statistic and the p-value and explain the meaning of our conclusion in words)

(Total 20 Marks)