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No of Questions - 09

**SCHOOL OF ACCOUNTING AND BUSINESS**  
**BSc. (APPLIED ACCOUNTING) GENERAL / SPECIAL DEGREE**  
**PROGRAMME**

**YEAR I SEMESTER II (INTAKE V – GROUP B)**  
**END SEMESTER EXAMINATION – OCTOBER 2016**

**QMT 10230 Business Statistics**

Date : 23rd October 2016  
Time : 9.00 a.m. - 12.00 p.m.  
Duration : Three (03) hours

**Instructions to Candidates:**

- Write your Index Number in the space provided at the top of this sheet. Do not write your name anywhere in this question paper.
- This paper consists of three parts (I, II and III).
- Part I – Answer **ALL** the questions in this paper itself.  
Part II – Answer any **FIVE (05)** questions only  
Part III – Answer **ALL** the questions.
- The total marks for the paper is 100.
- The marks for each question are shown in brackets.
- Use of scientific calculator is allowed.
- Answers should be written neatly and legibly.

## PART I

Answer **ALL** Questions

### **Question No. 01**

Underline the correct answer.

1. A population is divided into number of small groups where it can be identified high homogeneity between the groups and heterogeneity within groups. In order to select a sample in this population the most suitable sampling method would be
  - i. Simple Random Sampling
  - ii. Stratified sampling
  - iii. Cluster sampling
  - iv. Multi-stage Sampling
2. Which of the following will not be a disadvantage of the mailing questionnaire method?
  - i. Less response rate
  - ii. Consume more time
  - iii. High cost
  - iv. Inability to explain questions to respondents
3. To measure the effectiveness of a production process, 25 items are selected from each lot and their quality is measured. This exercise is repeated over two months covering 100 lots. Based on the quality of the selected items they were labeled as either defective or non-defective. Number of lots with different number of defective items is counted and presented in the following table. Maximum number of defective items found in any lot is recorded as 8.

Number of Defective items – X	0	1	2	3	4	5	6	7	8
Number of Packets - f	8	12	17	23	14	11	8	4	3

What will be the mean number of defectives per lot?

- i. 3.26
- ii. 3.34
- iii. 12.5
- iv. 13.04

4. Absenteeism is a serious issue identified in many organizations. Therefore, organizations frequently maintain records on employee absenteeism. Such absenteeism data collected in a particular organization is presented below. Maximum number of days absent by an employee is recorded as 8 during this period.

Number of Days Absent – X	0	1	2	3	4	5	6	7	8
Number of Employees - f	23	32	45	18	11	4	2	1	1

If you were asked to present the above situation to the board of management, what measurement will be most suitable to summarize the given data?

- i. mean
  - ii. median
  - iii. mode
  - iv. range
5. Two hundred and fifty (250) resource persons from different parts of the country participated for a workshop conducted at the University of Vergenia. They were served with either fried rice or lump rice for the lunch with either caramel pudding or watalappam for the desert. Hundred participants requested fried rice where 75 participants requested caramel pudding. Out of those who requested fried rice 60% requested watalappam. What percentage of the participants did request both lump rice and caramel pudding?
- i. 35 %
  - ii. 40 %
  - iii. 60 %
  - iv. 115 %
6. It was guaranteed that 90% of the seeds in a packet germinate successfully. If a farmer bought a packet with 15 seeds, what is the probability that at least 3 of them will not germinate successfully.
- i. 0.0555
  - ii. 0.1840
  - iii. 0.2669
  - iv. 0.8160

7. It was noticed that, on an average 42 patients were attending a clinic during an hour. The management decides to open up two counters for channeling doctors and it will take 5 minutes to serve a single patient's request. What is the probability that at least one patient should be in the queue before getting the service done.
- i. 0.1359
  - ii. 0.1850
  - iii. 0.3209
  - iv. 0.6791
8. Light bulbs produced by a certain process have a life time of 2.4 years with a variance of 1.44 years. The manufacturer guaranteed that these light bulbs have a life time of 3 years. Find the probability that a randomly selected light bulb will fail to meet the guarantee.
- i. 0.3085
  - ii. 0.3372
  - iii. 0.6628
  - iv. 0.6915
9. The simple linear regression model for the relationship between average daily sales of ice-cream (in rupees) and the average daily temperature (in degrees Celsius) is given by

$$\hat{Y}_i = 3124.56 + 136.49 X_i$$

It was estimated that the average daily temperature on 12<sup>th</sup> December, 2016 will be 23<sup>0</sup> Celsius. What will be the average amount of sales expected?

- i. 6263.83
- ii. 3139.27
- iii. 3261.05
- iv. 3124.56

10. A risky investment yield following cash inflows.

Cash inflow - $f_i$	Rs. 52,000	Rs. 60,000	Rs. 75,000	Rs. 40,000
Probability - $p_i$	0.30	0.20	0.15	0.35

What is the expected cash inflow of this investment?

- i. Rs. 52,850
- ii. Rs. 56,000
- iii. Rs. 56,750
- iv. Rs. 57,500

**(Total 30 Marks)**

## **PART II**

Answer any **FIVE (05)** questions only

### **Question No. 02**

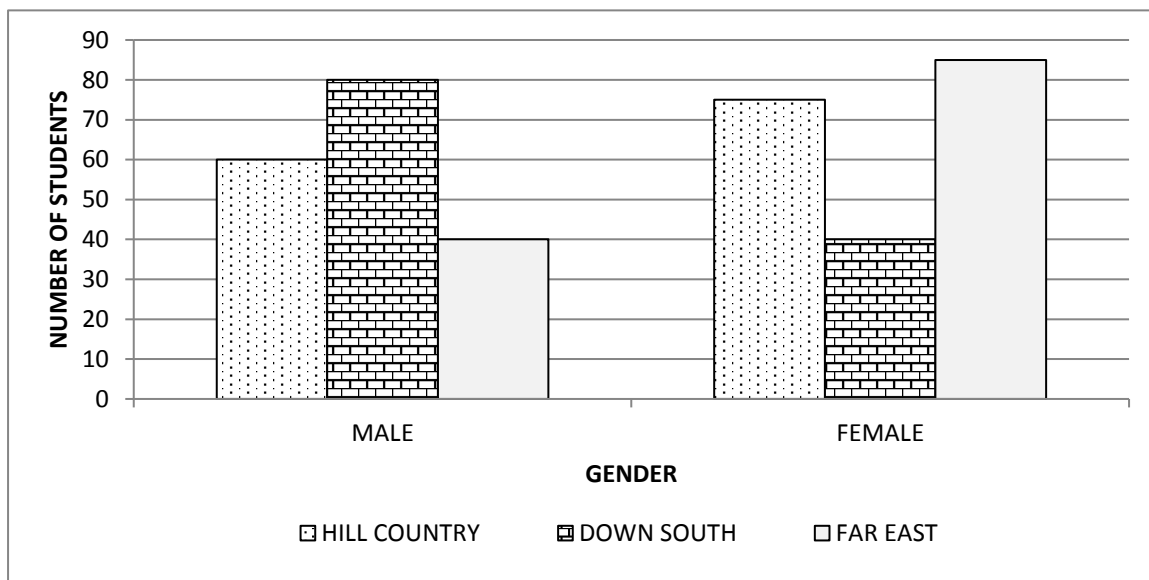
- i. Explain why multi-stage sampling is preferred over simple random sampling when there is homogeneity between the groups as well as within the groups.  
(02 marks)
- ii. List four (04) advantages of sampling survey compared to census survey.  
(02 marks)
- iii. For the purpose of data collection, telephone interview and face to face interview methods can be used. However, both these methods have their own limitations.  
Mention four (04) disadvantages of telephone interview method compared to face to face interviews.

(04 marks)

**(Total 08 Marks)**

### **Question No. 03**

The Business Statistics Students Union at University of Vergenia has decided to get the consent of the members in relation to the final destination of their annual batch trip. The information they collected is presented in the following bar chart.



- i. Prepare a two way table to show clearly the information presented in the above chart.  
(03 marks)
  - ii. According to the table you prepared in part (i) above or the given multiple bar chart, identify the place preferred by
    - a. most number of students
    - b. least number of students  
(02 marks)
  - iii. Mention three other important comments that you can make from the above chart/table.  
(03 marks)
- (Total 08 Marks)**

**Question No. 04**

CITY BANK has recently introduced debit cards among its customers to avoid the filling of forms when withdrawing cash from their accounts. As most of the customers switched over to this new method of transaction, management has noticed that there are long queues at debit card outlets frequently. Therefore, they have collected data on the waiting time per customer on 25 randomly selected outlets, to see the possibility of arriving at a solution. The table given below is constructed using the data collected by them.

Waiting time per Customer (in seconds)	Number of Customers
0 – 30	15
30 – 60	25
60 – 90	38
90 – 120	27
120 – 150	17
150 - 180	13

Calculate

- i. Mean waiting time per customer

(04 marks)

- ii. Variance of the waiting time per customer

(04 marks)

**(Total 08 Marks)**

### **Question No. 05**

*WEESHA DOG LOVERS* is a dog food importing agent who sells two types of dog food varieties *RAFDAG* and *SPECIAL TREAT*. Both varieties are packed in 1kg packets and are sold at their three outlets in Colombo, Kandy and Galle. Out of these three outlets, the highest sales were recorded in Colombo which was 45% of the total sales followed by 30% sales at Kandy outlet. On the other hand, the highest demand was for *SPECIAL TREAT* which recorded as 52% during the period. Sales of both food varieties at Kandy outlet were equal where at the Galle outlet 40% of the total demand was for *SPECIAL TREAT*.

- i. Represent the above information in a tree diagram or a 3x2 table.  
(04 marks)
  - ii. Using the tree diagram or the table, you presented in part (i) above, find the probability that a randomly selected order is
    - a. for special treat and made at the Colombo outlet  
(01 mark)
    - b. made at the Galle outlet given that it is for *RAFDAG*  
(03 marks)
- (Total 08 Marks)**

### **Question No. 06**

Given below are the cash flows for the first two years of a risky investment project.

First	Cash inflow (Rs.'000)	20	40	50	50	60
Year	Probability	0.15	0.15	0.20	0.30	0.20

Second	Cash inflow (Rs.'000)	20	30	40	50	60
Year	Probability	0.10	0.15	0.20	0.25	0.30



Calculate the following for each year separately

i. Expected value

(02 marks)

ii. Variance

(04 marks)

iii. Coefficient of Variation

(02 marks)

**(Total 08 marks)**

**Question No. 07**

Sudaroliyan government has recently built a large grain shipping port at Rusikawa bay for exporting grain, grown in the different parts of the country. As grain is a seasonal export item, the port operates only 50 days per year during the period of July-August. It has the capacity of loading up 7 ships at seven different crews simultaneously. All the crews operate 24 hours per day. Time required to load a single ship is estimated as 6 hours. The expected number of ships to be arrived during the 50 days of this year was 600.

i. Define a suitable random variable to answer the following questions and mention the underline distribution with relevant parameters.

(02 marks)

ii. If the Sudarolian government decides to operate only three crews at a time, find the probability that

a. The port being idle (All three crews being idle).

(01 mark)

b. All three crews will be busy.

(05 marks)

**(Total 08 marks)**

### PART III

Answer **ALL** questions

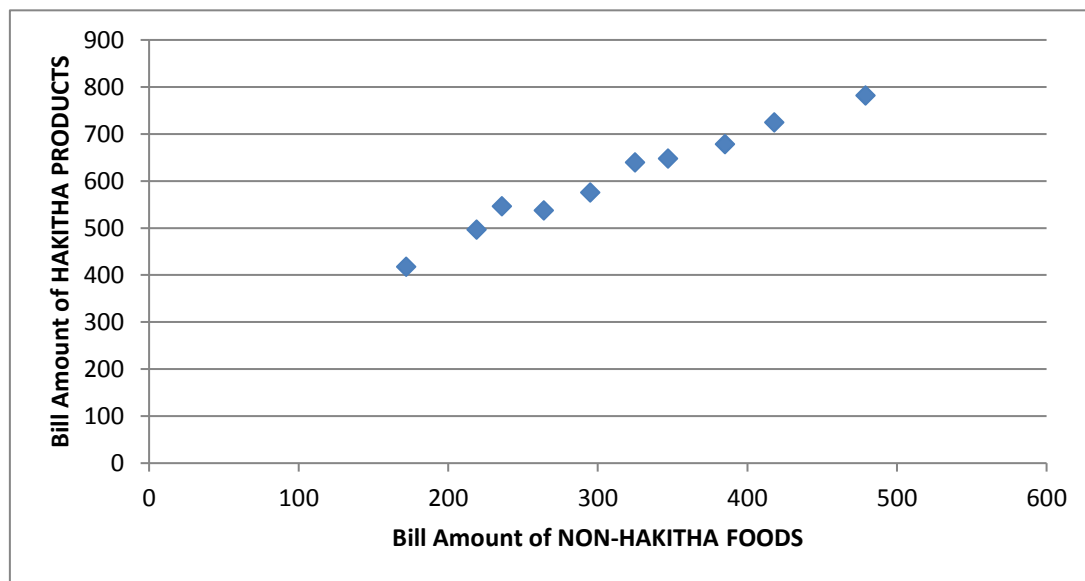
#### **Question No. 08**

*HAKITHA FOOD PEOPLE* is a chain of supermarkets operated over Sudaroliya. Recently the management of *HAKITHA FOOD PEOPLE* has decided to introduce the *HAKITHA CONCEPT* to enhance their market share. Accordingly, they randomly select certain number of items each day and label them as *HAKITHA PRODUCTS* and decided to offer attractive discounts in purchasing such items.

To measure the effectiveness of *HAKITHA CONCEPT*, total bill amount on *HAKITHA PRODUCTS* and *NON-HAKITHA PRODUCTS* is collected separately, over the month of September, 2016 for 10 branches of *HAKITHA FOOD PEOPLE* and presented in the following table.

Branch Number	Bill Value of HAKITHA PRODUCTS (Rs. '000)	Bill Value of NON-HAKITHA PRODUCTS (Rs. '000)
1	325	640
2	264	538
3	418	725
4	385	679
5	172	418
6	295	576
7	236	547
8	347	648
9	479	782
10	219	497

- i. The scatter diagram drawn for the collected data is given below.



Using the above diagram discuss the relationship that can exist between the two variables.

(01 mark)

- ii. a. Assuming the bill value on HAKITHA PRODUCTS as the independent variable and the bill value on NON-HAKITHA PRODUCTS as the dependent variable, construct a table to obtain the values for  $\sum(X - \bar{X})(Y - \bar{Y})$ ,  $\sum(X - \bar{X})^2$  and  $\sum(Y - \bar{Y})^2$ .

(08 marks)

- b. Using the table you construct in part (a), fit a simple linear regression model for the above data.

(04 marks)

- c. The *METRO CITY* branch of the *HAKITHA FOOD PEOPLE* is expected to sell HAKITHA PRODUCTS worth of Rs. 500, 000 during December, 2016.

Calculate her expected sales on NON-HAKITHA PRODUCTS during the same month.

(02 marks)

**(Total 15 marks)**

**Question No. 09**

It is necessary in Sudaroliya to obtain the approval from the Municipal Council before the commencement of any construction. But the people residing in Chithagon Municipal Council area in Sudaroliya is frequently complaining that the building approval is a lengthy process which takes a considerable time. Therefore the Mayor has collected the quarterly data on the number of approvals given for new constructions over the last three years which is given below.

	Q <sub>1</sub>	Q <sub>2</sub>	Q <sub>3</sub>	Q <sub>4</sub>
2013	95	150	190	145
2014	115	170	210	185
2015	135	190	230	205

Mayor wants to identify whether there exists any pattern in the quarterly approvals and requests your assistance to identify such.

- i. Use quarterly approval figures to obtain the moving average trend for each quarter.  
(06 marks)
- ii. Using the trend values you obtained in part (i) above and assuming the additive model calculate the seasonal indices for each quarter.  
(06 marks)
- iii. Using the trend values and seasonal indices you calculated in parts (i) and (ii) above, forecast the expected number of approvals to be given for new constructions in the third quarter of 2016.

(03 marks)

**(Total 15 Marks)**