CHRIST UNIVERSITY,BENGALURU - 560029

End Semester Examination September/October - 2016

Bachelor of Science CMS V SEMESTER

Code: STA531 **Max.Marks: 100**

Subject: DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY **Duration: 3Hrs**

SECTION A

Answer any TEN questions. **10X3=30**

1 Name the main characteristics of R software.

2 Write the command in R software for drawing the box plot of the "eruption duration" variable in the data set faithful. Explain each step in brief.

3 Write all steps for conducting t-test using R software.

4 **What are the various types of brackets used in R? Explain in brief.**

5 Mention the advantages of sampling over complete census.

6 Can we apply stratified sampling to study student's achievements in different schools of a district? Explain in brief.

7 Define "experimental error" and give two examples.

8 Give three reasons for missing observations in experimental designs.

9 Define crude birth rate and age specific fertility rate.

10 Define " Curate expectation of life" and " Complete expectation of life".

11 Distinguish between "concept" and " construct" in research with examples.

12 What are the various steps in formulation of research problem?

SECTION B

Answer any Five questions. **5X6=30**

13 Define "paste", "rep" "for loop"and "while loop" in R and give examples.

14 Differentiate between SRS with and without replacement. Show that the probability of selecting a specified unit of the population at any given draw is equal to the probability of it being selected at the first draw.

15 Define RBD. What are its applications and advantages?

16 What is a treatment contrast? When are two such contrasts said to be orthogonal? Show that in a 22 factorial experiment the main effects and the interaction effects are mutually orthogonal.

17 What is Pearle's vitality index? Define GRR and NRR mathematically.

18 Define "Central mortality rate" and derive it's expression.

SECTION C

Answer any FOUR questions. **4X10=40**

19 (i) Name and explain the in-built functions in R for normal distribution.

(ii) Write R code for the following:

(a) Create a sequence of numbers between -10 and 10 incrementing by 0.1.

(b) Choose the mean as 2.5 and standard deviation as 0.5.

(c) Give the chart file a name.

20 Write the steps and R code for the following. Write the code only.Do not solve it.

(a) An insurance company is reviewing its current policy rates. When originally setting the rates they believed that the average claim amount was 1, 800$. They are concerned that the true mean is actually higher than this, because they could potentially lose a lot of money. They randomly select 40 claims, and calculate a sample mean of 1, 950$. Assuming that the standard deviation of claims is 500$, and set $\alpha = 0.05$, test to see if the insurance company should be concerned using an appropriate test statistic.

(b) How do you analyze this data ?

A drug company tested three formulations of a pain relief medicine for migraine headache sufferers. For the experiment 27 volunteers were selected and 9 were randomly assigned to one of three drug formulations. The subjects were instructed to take the drug during their next migraine headache episode and to report their pain on a scale of 1 to 10 (10 being most pain).

Drug A 4 5 4 3 2 4 3 4 4

END SEMESTER QUESTION PAPER

Drug B 6 8 4 5 4 6 5 8 6

Drug C 6 7 6 6 7 5 6 5 5

21 How do you allocate sample sizes in proportional and optimal allocation? Give the relationship between SRS, Neyman and proportional allocation after defining each one. (Write all formulae with notations)

22 Statistically analyze the completely randomized design.

23 Statistically analyze the 2^3 factorial experiment.

24 Complete the following table:

x	0	1	2	3	4	5	6
lx	100	90	80	75	60	30	0

If X,Y,Z are three rabbits of age1, 2 and 3 years respectively, find the probability that

1. at least one of them will be alive for one year more.

2. X,Y,Z will be alive for two years time.

Explain all columns clearly

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