



# MACHAKOS UNIVERSITY

University Examinations for 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (STATISTICS AND PROGRAMMING)

SST 200: INTRODUCTION TO COMPUTER INTERACTIVE STATISTICS

DATE: 13/12/2017

TIME: 2:00 – 4:00 PM

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## INSTRUCTIONS

Answer Question One and Any Other Two Questions

### QUESTION ONE (COMPULSORY) (30 MARKS)

- Distinguish between user defined functions and in-built functions in R-Programming. (2 marks)
- Using an example, describe what a comment is and why comments are important when writing code in R-Programming (3 marks)
- Create a function to print the square of numbers in a sequence. Write code to call the function and pass 4 arguments (5 marks)
- Using an example, highlight the key components of a function in R-Programming (4 marks)
- Using appropriate string manipulation functions, concatenate the following separate strings (2 marks)  
  
a <- "Please"  
b <- 'feel'  
c <- "at home"
- Create a array with three elements each which are 2X2 and print the results (4 marks)
- Write code to convert the following list to a vector and print the results (4 marks)  
list1 <- list (1:5)  
print (list1)  
list2 <-list (10:14)  
print (list2)
- Define packages and describe two ways of installing new packages (6 marks)

## QUESTION TWO (20 MARKS)

- a. Using an example describe a variable (2 marks)
- b. Giving reasons, state whether the following variable names qualify to be valid variable names in R-Programming (2 marks)
- \_student\_name
  - student\_weigth5
- c. Using an example, show how to display a dataset in R-Language (2 marks)
- d. Differentiate between the following data types in R-Language (2 marks)
- Array and Matrix
- e. Discuss four characteristics of a data frame (4 marks)
- f. The code below represents a data frame.

```
student.data <- data.frame(  
  student_id = c(1:5),  
  student_name = c("Rick", "Dan", "Michelle", "Ryan", "Gary"),  
  score = c(623.3, 515.2, 611.0, 729.0, 843.25),  
  cours_start_date = as.Date(c("2012-01-01", "2013-09-23", "2014-11-15", "2014-05-11",  
  "2015-03-27")),  
  stringsAsFactors = FALSE  
)
```

Write code to extract the student\_name and score columns and print the results. (4 marks)

- g. Using string manipulation functions, extract the characters on the 3<sup>rd</sup> and 6<sup>th</sup> position and print the results. (4 marks)
- ```
a <- "Flamboyant"
```

## QUESTION THREE (20 MARKS)

- a. Write a program that calculates the surface area of a closed cylinder. Use a function. (5 marks)
- b. Using appropriate examples, differentiate between the following data types in R-Language:
- i) Factor and Data Frame (4 marks)
  - ii) Vector and List (4 marks)
  - iii) Matrices and Arrays (4 marks)
- c. Create a factor object to hold the following data "RED", "GREEN", "BLUE" (3 marks)

#### QUESTION FOUR (20 MARKS)

- a. Using appropriate examples, differentiate between the following operators in R-Language:  
Arithmetic operators and operational operators (4 marks)  
Logical operators and Assignment operators (4 marks)
- b. Create a list containing the strings "Car" , "Bicycle" ,"Airplane" , "Train" , "Ship". (2 marks)
- c. Create a vector to hold the data "12" ,"34" ,"57" , "TRUE" (2 marks)
- d. Using appropriate examples discuss four program control structures used in R-Language (8 marks)

#### QUESTION FIVE (20 MARKS)

- a. Using in-built R-Language functions, write code to perform the following:  
i) Print a sequence of numbers from 23 to 35 (2 marks)  
ii) Find the mean of a numbers from 67 and 34 (2 marks)  
iii) Find the sum of a numbers from 1 and 10 (2 marks)
- b. State whether the following are valid strings in R-Language giving reasons  
i) <- 'Mixed quotes" (2 marks)  
ii) <- 'Double quotes " in between single quote' (2 marks)  
iii) <- "single quote ' in between double quotes" (2 marks)  
iv) <- 'Single quote ' inside single quote' (2 marks)  
v) <- "Double quotes "inside double quotes" (2 marks)
- c. Describe the following terms as used in R-Programming  
i) Data reshaping (2 marks)  
ii) Melting (1 mark)  
iii) Casting (1 mark)