



TECHNICAL UNIVERISTRY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATIONS FOR DEGREE IN:
BACHELOR OF SCIENCE IN MATHEMATICS & COMPUTER SCIENCE (BMSC Y3 S2)

EIT 4317: SIMULATION & MODELLING

END OF SEMESTER EXAMINATION

SERIES: APRIL 2015

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions.

Attempt question **ONE (Compulsory)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (Compulsory)

- a) Explain the benefits and limitations of simulation (10 marks)
- b) Briefly discuss any FIVE methods that can be used to generate random numbers. (10 marks)

- c) Briefly express the steps followed in simulation and modeling **(10 marks)**

Question Two

- a) Explain factors that need to be considered when selecting a simulation software **(6 marks)**
- b) Explain the various simulation languages **(6 marks)**
- c) A common electrical engineering circuit fragments is a high pass filter shown below:

V_{in}

A high pass filter takes in input voltage V_{in} and removes high frequency content before passing it to the output voltage v_{out} specifically, it allows frequencies lower than:

$$f_o = \frac{1}{2\pi RC} \text{ (Hz)}$$

to be passed and starts blocking signals higher than f_o (Hz). Required:

Create a program in Matlab called Myfile that takes just one argument, for and returns the resistance value R required to make a high filter with cut-off f_o , assuming you are using a 10 mf capacity **(8 marks)**

Question Three

- a) Write a program called Grade needed that takes 3 number, your current course grade (call it current grade), the percent weight of your final exam in your total grade (call it exam weight) and your desired course grade (call it desired grade). Have it return one number. Exam Grade, the score you need to make on the final exam to achieve this grade. The equation:

$$\text{Exam grade} = \frac{\text{Desired grade} - \text{current grade} (1 - \text{exam weight})}{\text{Exam weight}} \quad \text{(4 marks)}$$

- b) Briefly explain how files are created and accessed in matlab **(4 marks)**
- c) Write a Matlab function that calculates the sum of the squares of the first n integers **(6 marks)**
- d) The figure below shows a cylindrical tank with a conical base. if the liquid level is quite low, in the conical part the volume is simply the conical volume of liquid. **(6marks)**
If the liquid level is midrange in the cylindrical part the total volume of liquid includes the filled conical part and the partially filled part. Use decisional structures to write an M-file to compute the tank's volume as a function of given values of R and d. Design the function so that it returns the volume of all cases where the depth is less than 3R, return as even message ('overtop') if you overtop the tank that is $d > 3R$

Figure 1**Question Four**

- a) An amount of money P is invested in an account where interest is compounded at the end of the period. The future worth f yielded an interest rate I after n periods may be determined from the

$$f = \frac{PRT}{100}$$

following formula.

Required:

(10 marks)

Write m-file that will calculate the future worth of an investment for each year from 1 through n

- b) Differentiate between stochastic model and deterministic models **(6 marks)**
- c) Name FOUR real world problems in business where simulation is applied and their solution methods **(4 marks)**

Question Five

A sales man arranged to make a call each day for the next 10 working days. Previous experience showed that each arranged call had a 10% chance of cancellations. When a call was made, the expected chances of success in making sales are as shown below:

Result	%
No sales	50
1 unit sold	10
2 units sold	30
3 units sold	10

At the start of the 10 days period, he assumed that 5 units were in stock and a further 4 would be made available on day 6. Orders are dispatched on the same day they were placed. However, if no stock were available order would be held until the next delivery of stock. Required:

Use a tabular simulation to cover the 10 days. Show whether each call was made and its results

Use the following random nos

5, 4, 5, 6, 2, 9, 3, 0, 3, 9, 3, 4, 8, 4, 9, 8, 4

(20 marks)