FACULTY OF COMMERCE & MANAGEMENT STUDIES
University of Kelaniya, Sri Lanka.

Bachelor of Business Management Honours in Financial Engineering Degree Examination

UNIVERSITY OF KELANIYA

Faculty of Commerce and Management Studies

2021/2022 Academic Year – Year 3 – Semester I

Computing for Finance - BBFE 31382/BBFE 31382 (R)

Saturday 19th August 2023

No of pages 03

Instructions to candidates

1) **Do NOT open this paper until instructed by the supervisor.**
2) **You must NOT start answering the questions until instructed by the supervisor.**
3) **Time allowed TWO (02) hours.**
4) **Total marks allocated to the paper 100.**
5) **Total number of questions 4.**
6) **Answer all the question(s).**

General Instructions:

- **Write programs using MATLAB / Octave for the given tasks in each question.**
- **Use the answering format (MS Word document) provided in the EVAL to answer the questions. Fill the details (Name with Initials / Student Number) in the MS Word document (Answer_Format.docx).**
- **Copy the code and the output of each program and paste it under the question number in the MS Word document (Answer_Format.docx).**
- **Rename the Answer_Format.docx with your student number (For ex. FE_2019_XXX) and upload it using the submission link to the EVAL.**

Question No. 01

a) Calculate the prime factors for the following values using MATLAB / Octave.

i. 564

ii. 101226

iii. 14

iv. 1523

(04 Marks)

b) Evaluate the following expressions using the MATLAB / Octave for values of $x = 15, y = 12, z = 8.4$.

i. $a = \frac{3x}{10^{-6}} + \ln\left(\frac{(25+1)y}{4z^2}\right)$

ii. $b = \frac{\sqrt[y]{255x+2}}{(11-4)^{5z/6}}$

iii. $c = \frac{\ln(xy) + log10(3z)}{3\pi}$

iv. $d = ln\,(x^2 + 2xy + y^2) + log_{10}(3z^2 + 5z + 2)$

v. $e = |xyz|$

(10 Marks)

c) Consider the following vector and write down the correct MATLAB / Octave commands to access the following elements.

$$k = \begin{bmatrix} -5 \\ -18 \\ 12 \\ 11 \\ 5 \\ 21 \\ 32 \end{bmatrix}$$

i. 11

ii. a = [-5 -18 12]

iii. $b = \begin{bmatrix} 12 \\ 11 \\ 5 \end{bmatrix}$

iv. $c = 21$

(04 Marks)

d) Create the following vectors in MATLAB / Octave without manually typing all the values

i. $x = \begin{bmatrix} -3 \\ 0 \\ 3 \\ 6 \\ 9 \\ 12 \end{bmatrix}$

ii. $y = [-2.6 \; -1.2 \; 0.2 \; 1.6 \; 3 \; 4.4]$

iii. $z = \begin{bmatrix} 8.2 \\ 7.6 \\ 7.0 \\ 6.4 \end{bmatrix}$ **(03 Marks**

e) Find the roots of following equations using MATLAB / Octave built-in functions.

i. $y = 4x^3 + 20x^2 + 10x + 40$

ii. $y = x^3 - 4x^2 + 15x - 9$

iii. $y = 5x^3 + 3x^2 + x + 1$ **(09 Marks**

(Total 30 Marks

Question No. 02

Write programs for the given tasks in each part – (a), (b), (c), (d) and (e) using MATLAB / Octave

a) Write a program to prompt the user to input a value for d, a distance in km, and calculat how long it takes to drive that distance at 60 kmh^{-1}. If it is greater than 23 $hours$, displa a message that it will take more than one day.

$$\left[\text{Hint: } Time = \frac{Distance}{Speed}\right]$$

(06 Marks

b) A shop will give a discount of 10% if the cost of purchased quantity is more than 1000. As the user for quantity. Suppose one unit will cost 100. Judge and print total cost for user.

(06 Marks

c) A school has following rules for grading system:

Below 25 - F
25 to 45 - E
46 to 50 - D
51 to 60 - C
61 to 80 - B
Above 80 - A

Ask the user to enter marks and print the corresponding grade. **(06 Marks**

d) A student will not be allowed to sit an exam if his/her attendance is less than 75%. Take th following input from the user: 1.) number of classes held; 2.) number of classes attended And print percentage of class attended and whether student is allowed to sit in exam or not

(06 Marks

e) A company decided to give a bonus of 5% to an employee if his/her year of service is more than 5 years. Ask the user for their salary and year of service and print the net bonus amount.

(06 Marks)

(Total 30 Marks)

Question No. 03

a) 'Sirilak' Manufacturing Company's total cost function (in LKR) for its Product 'X' is: $TC = 3000 + 250Q + 0.2Q^2$ where Q = number of units produced from the Product 'X'. The company sells the product at a unit price of Rs. 400. Plot the monthly total cost and monthly total revenue $(P \times Q)$ and monthly total profit curves in the same graph in MATLAB/Octave assuming the monthly production increased from 0 units to 5000 units per month (increase by 500 units at once). (You need to provide the graph and MATLAB / Octave code used to create the graph as the answer.) Find the break-even point of the Product 'X'. **(10 Marks)**

b) Create a MATLAB / Octave function file to return the Net Present Value (NPV) of an investment proposal which has equal periodic payments, when the interest rate, number of periods, initial investment and the periodic payment is given. Write another MATLAB / Octave script file that uses the above function file to evaluate between two investment proposals (having annual returns at the end of each year) using the NPV method. The program should request the user to input the initial investment, no of periodic payments, values of each periodic payment and the interest rate. The program should calculate NPV for both proposals and give its suggestion about acceptance / rejection. Use conditional logic / loops where necessary.

(10 Marks)

(Total 20 Marks)

Question No. 04

a) Solve each system of equations using Matrices in MATLAB / Octave.

i. $6x - 5y + 2z = 3$

$2x + y - 4z = 5$

$3x - 3y + z = -1$

ii. $2x - 5y + 3z = 8$

$3x - y + 4z = 7$

$x + 3y + 2z = -3$

(10 Marks)

b) Write a MATLAB / Octave program to find and display the roots of the following equation using the bi-section method. You have to write all the steps in the algorithm. Avoid using built-in functions used for root finding.

$$y = 3x^3 - 15x^2 - 20x + 50$$

(10 Marks)

(Total 20 Marks)