Mansoura University
Faculty of Engineering
Irrigation & Hydraulics Eng.

Graduate Studies
Sept. 04, 2013
Time allowed 3 hours

Computer Applications

N. B. - All sketches should be clear, neat and well proportioned.
- Any missing data may be reasonably assumed.

Question I: (20 Marks)

What is the result if you execute the following statements in Matlab Command Window?

No	Command entered (one by one)	What I see in Matlab window(s)	
		Command window	Workspace
1	% Matlab Final Exam		
2	a= [1 0 3 -4 7 -5]		
3	s = size(a);		
4	b = zeros(s(1), s(2))		
5	b = b +1 - a		
6	clear b		
7	b = 1:length(a)		
8	plot(a,b,'ro')		
9	d = [2,4,10;16,3,7;8,4,9]		
10	e = d'		
11	f = e(1,:)		
12	g = a + e		
13	fit((e(2,:))', (e(3,:))', 'exp1')('		
14	save my data.mat		
15	clear		
16	cos(a(2))		
17	load my data.mat		
18	cos(a(2))		
19	k = cell (2,2)		
20	help cell		

Question II: (24 Marks)

a) Write a Matlab script to find the cost of the fenced enclosure consists of a rectangle of length L and width $2R$, and a semicircle of radius R, as shown in Figure 1. The enclosure is to be built to have an area A of 1100 m^2 and the cost of the fence is L.E. 900/m. (12 marks)

b) In the problem shown in Figure 2, each element is 5 m long. Construct the matrix you would solve to find the forces in the elements. Use the element and node numbering shown in the figure. (12 marks)

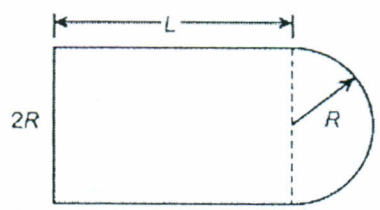

Fig. 1

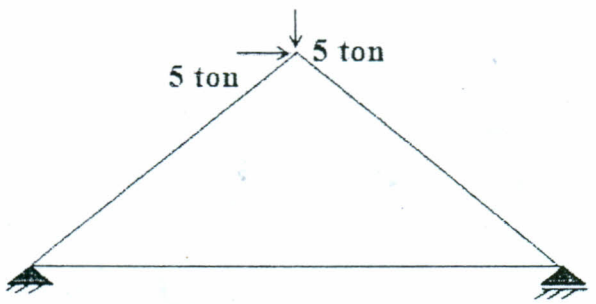

Fig. 2

P.T.O.

Question III: (20 Marks)

a) Use Matlab's trapz function to numerically integrate

$$f(x) = 0.20x - 100x^2 + 520x^3 - 720x^4$$

from a= 0 to b = 1. (7 marks)

b) Construct a quadratic interpolating function

$$Z = C_1 y^2 + C_2 y^1 + C_3$$

that pass through (x, y) support points (-1, -2), (-1, 2), and (3, -1). (7 marks)

c) Draw lines joining the following points: (5, 3), (4, 3), (4, 2) and (5,−1). Change the line color to red and the line style to dotted. Set the label of the axis x as 'x axis' and the axis y as 'y axis'. (6 marks)

Question V: (36 Marks)

a) Write a Matlab function (**culvert**) to draw the bending moment for a single vent R.C. box culvert due to dead load, rolling load and side pressure. (20 marks)

b) How to Build a Matlab Graphical User Interface (**box_culvert**) to execute the function (**cluvert**). (16 marks)

My best wishes

Dr. Samer Elabd