

Answer all the following questions

Q1. (8 marks) Write a MATLAB code to solve the following expressions:

(i)  $\int_1^2 3x^2 + 2x - 2 dx$

(ii)  $\frac{j^2+0.5j-\tan(\theta)}{j} + \sqrt{2}$  , Where  $\theta = 45^\circ$

Q2. (8 marks) Given the following MATLAB code:

```
A=[0:2 ; prod([0 3 1; 1 1 1; 2 0 2]); transpose([1;3;5])];  
B=[ones(1,2); linspace(1,2,2); A(1,1:2)];
```

- (i) What are the expected results of A and B  
(ii) Which of the following operations is possible? Clarify your answer.  
(1) A\*B (2) B\*A (3) B'\*A (4) rot90(B)\*A

Q3. (8 marks) What are the expected results of c when applying the following script?

```
a=4;  
b=-1;  
while b<=a+1  
c=2*a+sqrt(a)  
b=b+a^2+2;  
a=a^2;  
end
```

Q4. (8 marks) Write a MATLAB Code to solve the following system of equations (matrix method)

$$\begin{aligned} 4y + 3 + 5z &= -3x \\ 9x + 4z - y &= -12 \\ 5x - 2y - 25 &= 3z \end{aligned}$$

Q5. (8 marks) What are the expected results of a and b after running the following script with the design reference (1, 2, 3)

```
A=[0 1; 3 -1];  
design = input('design reference')  
switch design  
case 1;  
a=diag(A); b=zeros(2,2);  
case 2;  
a=reshape(A,1,4); b= A*inv(A);  
otherwise  
a=A(:,2); b=max(A);  
end
```

الاجابة النموذجية للأمتحان النهائي لمادة :  
التصميم بأستخدام الحاسب MATLAB  
الفصل الدراسي: ربيع 2017  
الفصل : الاول استدراكي  
القسم: الاتصالات - التحكم  
التاريخ: 2017.7.5

**Q1. (8 marks)** Write a MATLAB code to solve the following expressions:

(i)  $\int_1^2 3x^2 + 2x - 2 dx$

(ii)  $\frac{j^2+0.5j-\tan(\theta)}{j} + \sqrt{2}$  , Where  $\theta = 45^\circ$

**Solution**

(i) `syms x`  
`y=3*x^2+2*x-2;`  
`int(y,1,2)`

(ii) `teta = pi/4;`  
`y=((j^2+0.5*j-tan(teta))/(j))+sqrt(2)`

or

`y=(j^2+0.5*j-tand(45))/(j)+sqrt(2)`

**Q2. (8 marks)** Given the following MATLAB code:

```
A=[0:2 ; prod([0 3 1; 1 1 1; 2 0 2]); transpose([1;3;5])];
B=[ones(1,2); linspace(1,2,2); A(1,1:2)];
```

- (i) What are the expected results of A and B  
(ii) Which of the following operations is possible? Clarify your answer.  
(1)  $A*B$     (2)  $B*A$     (3)  $B'*A$     (4)  $\text{rot90}(B)*A$

**Solution:**

(i)

A =

0	1	2
0	0	2
1	3	5

B =

```

1  1
1  2
0  1

```

(ii)

1-A\*B is possible because the number of columns in A is the same as the number of rows in B.

2-B\*A is not possible because the number of columns in B is not the same as the number of rows in A

3-B' =

```

1    1    0
1    2    1

```

B'\*A is possible because the number of columns in B' is the same as the number of rows in A.

4-rot90(B) =

```

1    2    1
1    1    0

```

rot90(B)\*A is possible because the number of columns in rot90(B) is the same as the number of rows in A.

**Q3. (8 marks)** What are the expected results of c when applying the following script?

```

a=4;
b=-1;
while b<=a+1
    c=2*a+sqrt(a)
    b=b+a^2+2;
    a=a^2;
end

```

**Solution:**

$$c =$$

$$10$$

$$c =$$

$$36$$

**Q4. (8 marks)** Write a MATLAB Code to solve the following system of equations (matrix method)

$$4y + 3 + 5z = -3x$$

$$9x + 4z - y = -12$$

$$5x - 2y - 25 = 3z$$

**Solution:**

$$4y + 3 + 5z = -3x$$

$$9x + 4z - y = -12$$

$$5x - 2y - 25 = 3z$$

$$3x + 4y + 5z = -3$$

$$9x - y + 4z = -12$$

$$5x - 2y - 3z = 25$$

$$A = [3 \ 4 \ 5; \ 9 \ -1 \ 4; \ 5 \ -2 \ -3]$$

$$A =$$

$$3 \quad 4 \quad 5$$

$$9 \quad -1 \quad 4$$

$$5 \quad -2 \quad -3$$

$$b = [-3; -12; 25]$$

b =

-3

-12

25

inv(A) \*b;

**Q5. (8 marks)** What are the expected results of a and b after running the following script with the design reference (1, 2, 3)

```

A=[0 1; 3 -1];
design = input('design reference')
switch design
    case 1;
        a=diag(A); b=zeros(2,2);
    case 2;
        a=reshape(A,1,4); b= A*inv(A);
    otherwise
        a=A(:,2); b=max(A);
end
  
```

**Solution:**

design reference 1

a =

0

-1

b =

0      0

0      0

design reference 2

a =

0      3      1      -1

b =

1      0

0      1

design reference 3

a =

1

-1

b =

3      1



**Answer all the following questions**

**Q1. (8 marks)** Write a MATLAB Code to:

(i) Solve the following system of equations:

$$1 + 2x - x^4 = 0$$

(ii) Find the Laplace transform of:

$$2\sqrt{2} u(t) + r(t) + 0.5 e^{-at}$$

**Q2. (8 marks)** Looking to the given MATLAB code:

```
a=[0.5:0.5:1.5]; b=sum(sqrt(4)~=[1 2 3 ceil(1.1)]);  
A=prod([fix(a) min([2 1 2; 1 1 1; -1 3 4])]);  
B=rot90(reshape(a,3,1),b);
```

What are the expected results of the A and B?

**Q3. (8 marks)** What will be displaying on the screen for the given script if:

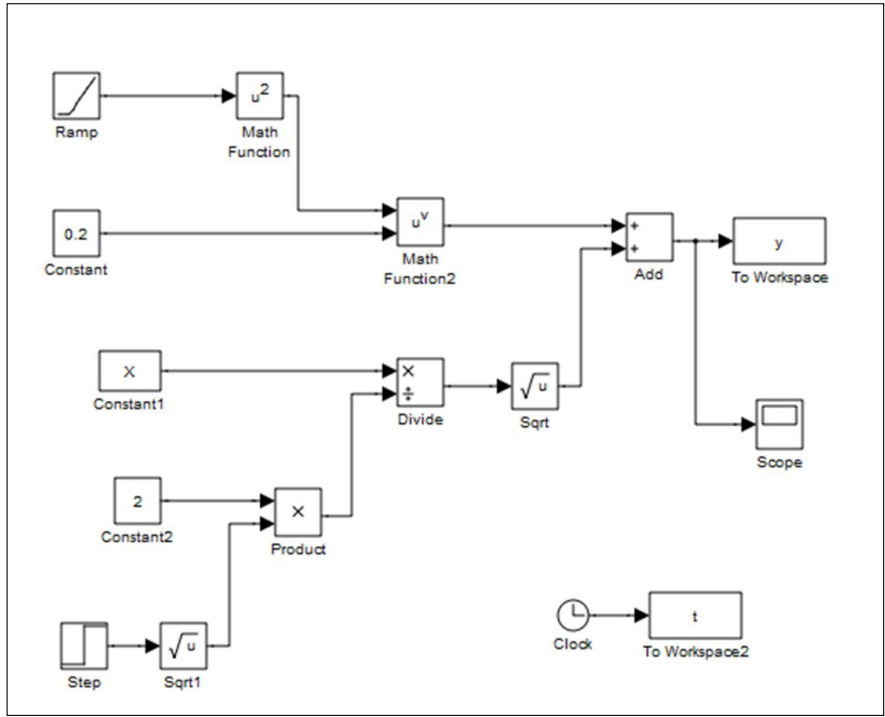
ref 1	ref 2	ref 3
15	35	30
10	15	40
12	58	28

```
for i=1:3  
p=input('ref 1')  
e=input('ref 2')  
c=input('ref 3')  
if p+e>=30 && p+e <60  
R=p+e+c  
if R >=50 && R <65  
disp('P')  
elseif R >=65 && R <75  
disp('G')  
elseif R >=75 && R <85  
disp('V.G')  
elseif R >=85 && R <=100  
disp('Ex')  
elseif R <50  
disp('F')  
else  
disp('wrong input')  
end  
elseif p+e<30  
disp('N.S')  
else  
disp('wrong input')  
end  
end
```



**Q4. (8 marks)** Represent the following Simulink model as:

- (i) A Mathematical expression.
- (ii) A MATLAB code, where  $t=0, 0.2, 0.4, \dots, 10$



**Q5. (8 marks)** Given the following signals:

$$X1 = \sqrt{2} \cos(0.2t)$$

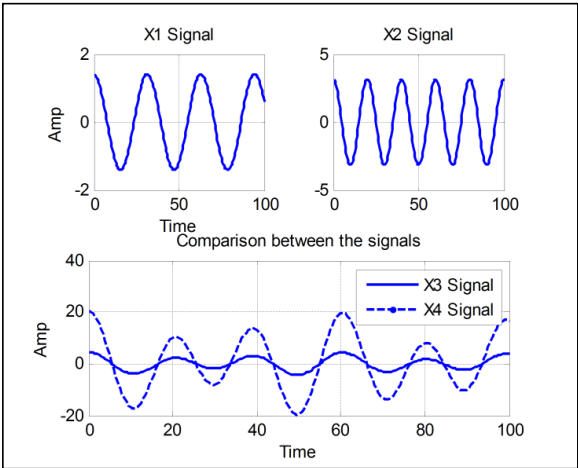
$$X2 = \pi \cos(0.1\pi t)$$

$$X3 = X1 + X2$$

$$X4 = X3 \int_1^2 3y \, dy$$

Where,  $t = 0, 0.5, 1, 1.5, \dots, 100$

Write a MATLAB Code to plot the signals as shown in the Figure



الاجابة النموذجية للأمتحان النهائي لمادة :  
التصميم باستخدام الحاسب MATLAB  
الفصل الدراسي: ربيع 2018  
الفصل : الرابع  
القسم : الاتصالات - التحكم  
التاريخ: 2018.7.16

**Q1. (8 marks)** Write a MATLAB Code to:

(i) Solve the following system of equations:

$$1 + 2x - x^4 = 0$$

(ii) Find the Laplace transform of:

$$2\sqrt{2} u(t) + r(t) + 0.5 e^{-at}$$

### Solution

(i) `roots([-1 0 0 2 1])` or `solve('-x^4+2*x+1=0')`

(ii) `syms s t a`  
`y=2*sqrt(2)+t+0.5*exp(-a*t)`  
`laplace(y,t,s)`

**Q2. (8 marks)** Looking to the given MATLAB code:

```

a=[0.5:0.5:1.5]; b=sum(sqrt(4)~=ceil(1.1));
A=prod([fix(a) min([2 1 2; 1 1 1; -1 3 4])]);
B=rot90(reshape(a,3,1),b);
  
```

What are the expected results of the A and B?

### Solution

A = 0

B =

1.5000

1.0000

0.5000

**Q3. (8 marks)** What will be displaying on the screen for the given script if:

ref 1	ref 2	ref 3
15	35	30
10	15	40
12	58	28

```
for i=1:3
    p=input('ref 1')
    e=input ('ref 2')
    c=input('ref 3')
    if p+e>=30 && p+e <60
        R=p+e+c
        if R >=50 && R <65
            disp('P')
        elseif R >=65 && R <75
            disp('G')
        elseif R >=75 && R <85
            disp('V.G')
        elseif R >=85 && R <=100
            disp('Ex')
        elseif R <50
            disp('F')
        else
            disp('wrong input')
        end
    elseif p+e<30
        disp('N.S')
    else
        disp('wrong input')
    end
end
```

### Solution

- 1- V.G
- 2- N.S
- 3- Wrong input

**Q4. (8 marks)** Represent the following Simulink model as:

- (i) A Mathematical expression.
- (ii) A MATLAB code, where t=0, 0.2, 0.4, ..... 10

### Solution

$$(i) \quad y = (r(t)^2)^{0.2} + \sqrt{\frac{x}{2\sqrt{u(t)}}}$$

(ii) t=0:0.2:10;

syms x

y=((t.^2).^0.2);

y=((t.^2).^0.2)+(sqrt(x/2));

Q5.

**Solution:**

```
clear all
close all
clc
t=0:0.5:100;
syms y
x1=sqrt(2)*cos(0.2*t);
x2=pi*cos(0.1*pi*t);
x3=x1+x2;
x4=x3*int(3*y,1,2);
subplot(2,2,1)
plot(t,x1)
title('x1 signal')
xlabel('time')
ylabel('Amp')
grid
subplot(2,2,2)
plot(t,x2)
title('x2 signal')
grid
subplot(2,2,3:4)
plot(t,x3)
hold on
plot(t,x4,'r')
title('comparison between the signals')
xlabel('time')
ylabel('Amp')
legend('x3 signal', 'x4 signal')
grid
```