

**Q1/** compute the following equations:

**a-**  $L = e^{\pi\sqrt{123}}$

**b-**  $z = \cos^2(\pi/4) + \sin^2(\pi/4)$

**c-**  $c = \ln(e) + \ln(e^3)$

**d-**  $h = \log(5) + \ln(5) + e^4$

**Q2/** Prove that the left-hand side of the equal sign corresponds to the other side:

**a-**  $(x - 1)(x + 4) = x^2 + 3x - 4$

**b-**  $x^2 - y^2 = (x - y)(x + y)$

**c-**  $\cos(x + y) = \cos(x)\cos(y) - \sin(x)\sin(y)$

**d-**  $\cos^2 x - \sin^2 x = 2\cos^2(x) - 1$

**Q3/** Extract 5 from the following matrix?  $A = \begin{pmatrix} 4 & 2 & 3 \\ 2 & 5 & 3 \\ 3 & 0 & -2 \end{pmatrix}$

**Q4/** Extract the third row from the following matrix?  $A = \begin{pmatrix} 2 & 3 \\ 4 & 2 \\ 7 & 3 \end{pmatrix}$

**Q5/** Extract the third row from the following matrix?  $A = \begin{pmatrix} 2 & 7 & 3 \\ 4 & 2 & 1 \\ 8 & 9 & 10 \\ 3 & 2 & 1 \end{pmatrix}$

**Q6/** Extract the matrix B from the matrix A?  $A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \end{pmatrix}$   $B = \begin{pmatrix} 5 & 6 \\ 9 & 10 \end{pmatrix}$

**Q7/** compute the following equations:

**1.**  $3x - 2y = 5, -5x + 6y = 3$

**2.**  $-9x + 5y = 16, 6x + 7y = 5$

**3.**  $3x + 2y - 9z = -65, -9x + 5y + 2z = 16, 6x + 7y + 3z = 5$

**4.**  $2x - y = 2, y - 2x = 5$

**Q8/** solve the following function:  $f(2,3) = x^2 + y^2$

**Q9/** solve the following function for  $x=5, 6, 7$ :  $g(x) = \frac{e^{-x}}{1+x^2}$

**Q10/** solve the following function for  $x=2, 3, 4$  and  $y=7, 9, 10$ :  $f(x, y) = \frac{\log(xy)}{xy^2}$

**Q11/** solve the following function for  $x=8, 2, 5$ :  $f(x) = \frac{x^2+10}{10e^x-5e^x}$

**Q12/** find the areas of triangles that have different bases(2, 6, 10, 14, 18) which have same heights(5)?

**Q13/** solve the following function for  $a=5, y=11$ , and  $x=2, 5, 8, 11$ :  $f = \frac{\ln(ax)}{1+y^2}$

**Q14/** Draw the following function for  $x=3, 4, 5, 6$ :  $F(x)=x^6\ln(x)+x^2\cos(x)$

**Q15/** solve following equation using m-file for  $y=4, 16, 10, 22$ :  $n = \frac{ye^{\sqrt{\pi}}}{y\sin(\pi)+y^3}$

**Q16/** Draw the following function for  $x=3, 4, 5, 6$ :  $F(x)=x^4\log(x^2)-x^3\sin(x)$

**Q17/** find areas of triangles that have different heights (4, 8, 5, 11) and same bases (7)?

**Q18/** compute the following equation for  $x=7, 3, 1, 5$ :  $L=\sin(x)\ln(x^3)-e^{-x\sqrt{\pi}}$

**Q19/** compute the following equation draw and publish it if you know that  $c=3 \times 10^8$  m/s and  $x=6, 12, 18, 24$ :  $Y=c^2\ln(x)/e^{2x}$

**Q20/** draw and publish (notebook) the following equation (using function m-file) for  $x=2, 24, 13, 35$ :  $y = \frac{2e^{-x}}{1-\ln x^2}$

**Q21/** Explain the following briefly:

1. Matlab
2. Format long
3. exact answer
4. vpa
5. Period
6. Functions
7. Variables
8. Punctuation marks
9. Subs
10. Sym

**Q22/** solve the following equations:

$$\begin{array}{ll} 1. (x-1)(x+4) = x^2 + 3x - 4 & 2. \begin{array}{l} 3x + 2y - 9z = -65 \\ -9x + 5y + 2z = 16 \\ 6x + 7y + 3z = 5 \end{array} \end{array}$$

$$3. u^2-(u+v)^2 = -2uv-v^2 \quad 4. c = \ln(e) + \ln(e^3\sqrt{4})$$

1. `>> syms x >> expand((x-1)*(x+4)) >> collect((x-1)*(x+4))`  $x^2 + 3x - 4$

2. `>> syms x y z >> [x,y,z]=solve('3*x+2*y-9*z=-65','-9*x+5*y+2*z=16',...  
'6*x+7*y-3*z=5'), double(x), double(y), double(z)`

3. `>> syms u v >> collect(u^2-(u+v)^2) >> expand(u^2-(u+v)^2)`



>>y = a + b, a = 2; b = sqrt(-4);

a. 2 + 2i

b. 2 - 2i

c. error message

d. NaN (it means not a number)

e. none of the above

Q29/ How do you set y to the 8 from the matrix shown below ?

$mat = \begin{pmatrix} 3 & 4 & 5 \\ 8 & 9 & 9 \\ 7 & 2 & 7 \end{pmatrix}$

A. y = mat[2,1]; B. y = mat(1,2); C. y = mat[1,2];

D. y = mat(2);

E. y = mat(2,1);

Q30/ We wish to plot the following function where the range of t from 0 to 5 with an increment of 0.1.

$$y = \frac{1}{(t - e^t)^3} + \sin(t)$$

```
function y=fqq1(t)
y=1./(t-exp(t)).^3+sin(t);
end
```

```
clear all,clc, close all
t=0:0.1:5;
y=fqq1(t);
plot(t,y)
```

Q31/ Write a Matlab function that adds the sine and cosine of each entry in a matrix?

$a = \begin{bmatrix} 1 & 3 & 5 \\ 5 & 11 & 17 \\ 10 & 6 & 2 \end{bmatrix}$

a=[1:2:5;5:6:17;10:-4:2]

ysin=sin(a), ycos=cos(a)

Q32/ Make a function that computes the 10! and 7!?

```
function y=facd(x)
f=1;
for n=2:x
    f=f*n;
end
y=f;
end
```

```
x=7;
y=facd(x)
x1=10;
y1=facd(x1)
```

Q33/ Draw the following table(with title & label of axis)?

```
clear all,clc
t=0:0.5:4;v=[100,62,38,21,13,7,4,2,3];
plot(t,v)
```

Time (s)	Capacitor voltage (V)
0.0	100
0.5	62
1.0	38
1.5	21
2.0	13
2.5	7.0
3.0	4.0
3.5	2.0
4.0	3.0

**Q34/** Make a function will take the parameters for a parabola and plot it. The parabola will be of the form:  $y = ax^2 + bx + c$  where  $a=10, b=4, c=3$  and  $x=-12$  to  $12$

<pre>function y=hapar(a,b,c,x) y=a*x.^2+b*x+c; end</pre>	<pre>clear all,clc, close all x=-12:12; a=10;b=4;c=3; y=hapar(a,b,c,x); plot(x,y)</pre>
--	---

**Q35/** Make a function that computes the x!? Calculate 3! and 6!?

Function is same as Q32

```
x=3;y=facd(x)
x1=6;y1=facd(x1)
```

**Q36/** Make a plot of  $y = e^{-3/2x} \sin(5x + 3)$  where  $x=0-20$  and change setting of the curve to be as follow  $0 \leq x \leq 5, -1 \leq y \leq 1$

```
clear all,clc, close all
x=0:20;y=exp(-3./(2*x)).*sin(5*x+3);
plot(x,y),axis([0 5 -1 1])
```

**Q37/** Write a function called cheby6 that evaluates the 6th Chebyshev polynomial. It should take an input variable, x ( $x=-10$  to  $10$ ), and plot the results with title and label axis.

$$32x^6 - 48x^4 + 18x^2 - 1$$

<pre>function y=cheb6(x) y=32*x.^6-48*x.^4+18*x.^2-1;</pre>	<pre>clear all,clc, close all x=-10:10;y=cheb6(x); figure,plot(x,y) title('Cheby6 polynomial') xlabel('x'),ylabel('y')</pre>
---	--

**Q38/** Draw the following equations using cell on the same figure where  $x=0$  to  $10$ :

$$y=x^2+e^{-x}/x \quad y1=e^{-x^2}e^{-x\sqrt{\pi}}/x \quad y3=\sin(x)/e^x$$

```
%% first equation
clc,clear all,close all
x=0:10;y=x.^2+exp(-x)./x;
plot(x,y)
%% second equation
x1=0:10;y1=exp(-2*x1).*exp(-x1*sqrt(pi))./x1;
hold on,plot(x1,y1)
%% third equation
x2=0:10;y2=sin(x2)./exp(x2);
plot(x2,y2),hold off
```

**Q39/** Draw the following table that obtained from RLC circuit and title and label the axis?

F/Hz	I/mA
1000	78
2000	70
3000	61
4000	52
5000	46
6000	41

```
clc,clear all,close all
f=1000:1000:7000;
ii=[78 70 61 52 46 41 37];
plot(f,ii),title('curve Of RCL circuit')
xlabel('F/Hz'),ylabel('I/mA')
```

Q40/ Write a function for the following Equations, and plot the results for a=-5 to 5.  $x = \frac{a\sqrt{2}}{2}$

$$y = \frac{1}{\sqrt{2\pi}} e^{-x^2/2} \quad z = 20 \log_{10} y$$

<pre>function z=zz(a) x=a*sqrt(2)/2; y=1/sqrt(2*pi)*exp(-x.^2/2); z=20*log10(y); end</pre>	<pre>clc,clear all,close all a=-5:5;z=zz(a); plot(a,z)</pre>
--	--

Q41/a. Compute 8!/5! After making a function for factorial?(Function is same as Q32)

```
x=8;y=facd(x)
x1=5;y1=facd(x1),af=x/x1
```

Q41/b. Draw the curve for the following table that is for forward bias of diode characteristics and title and label axis:

V/v	0.1	0.2	0.3	0.4	0.5	0.6	0.7
I/mA	0.0025	0.004	0.05	1	5	30	90

```
clc,clear all,close all
v=0.1:0.1:.7;ii=[0.0025,0.004,0.05,1,5,30,90];
figure,plot(v,ii)
title('Forward bias of diode characteristic')
xlabel('V/v'),ylabel('I/mA')
```

Q42/ The definition of the normal distribution is often called z distribution.

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-z^2/2} \quad z = (x - \mu) / \sigma$$

Where  $\mu=5, \sigma=0.5$  and  $x=0$  to 10. Make a function and draw the results?

<pre>function y=norz(x,miu,sig) z=(x-miu)/sig; y=1/sqrt(2*pi)*exp(-z.^2/2); end</pre>	<pre>clc,clear all,close all x=0:10;miu=5;sig=0.5; ff=norz(x,miu,sig); figure,plot(x,ff)</pre>
---	--

Q43/ Calculate and draw the values of the signal (function)

$$s(t) = \sin(2\pi 5t) \cos(2\pi 3t) + e^{-0.1t}$$

for a time vector of times between 0 and 10 with a step size of 0.1.

<pre>function y=ss2(t) y=sin(2*pi*5*t).*cos(2*pi*3*t)+exp(-0.1*t); end</pre>	<pre>clc,clear all,close all t=0:0.1:10;s=ss2(t); figure,plot(t,s)</pre>
--	--

Q44/ use cell mode in m-file to draw sin and cos built in function for x=1 to 10?

Q45/ Explain the following briefly:

1. dock
2. anonymous-function
3. semicolon
4. str2num
5. overload

Q46/ How publish your code with their outputs using notebook?

Q47/ solve the following equations:

1.  $\int \frac{-2x}{(1+x^2)^2} dx$
2.  $\int_0^1 x \ln(1+x) dx$
3.  $123 \rightarrow 3 \ 41$

```
1. syms x; int(-2*x/(1+x^2)^2) ans = 1/(x^2 + 1)
```

2. `syms x; int(x*log(1 + x), 0, 1)`      `ans = 1/4`

3. `factor(123)`

**Q48/** The velocity of a particle moving along the x axis varies in time according to the expression  $v_x = (40 - 5t^2)$  m/s, where t is in seconds. Find vx(t) and the average acceleration(ax) in the time interval ti = 0 to tf = 20 (function m-file)(i

$$\bar{a}_x = \frac{v_{xf} - v_{xi}}{t_f - t_i}$$

initial value, f final value).

<code>function y=q3af(t)</code>	<code>clc,clear all</code>
<code>y=40-5*t.^2;</code>	<code>t=0:20;vx=q3af(t)</code>
<code>end</code>	<code>ax=(vx(21)-vx(1))/(t(21)-t(1))</code>

Time (s)	Capacitor voltage (V)
0.0	100
0.5	62
1.0	38
1.5	21
2.0	13
2.5	7.0
3.0	4.0
3.5	2.0
4.0	3.0

**Q49/** Draw the following table (with title & label of axis?)

```
clear all,clc
t=0:0.5:4;v=[100,62,38,21,13,7,4,2,3];
plot(t,v)
```

**Q50/** The data in the following table represent measurements of the masses and dimensions of solid cylinders of aluminum, copper, brass, tin, and iron. Use these data to calculate the densities of these substances. ( $V=\pi r^2 L$ ,  $\rho=m/V$ )

```
clc,clear all
mm=[51.5 56.3 94.4 69.1 216.1];
dd=[2.52 1.23 1.54 1.75 1.89];
ll=[3.75 5.06 5.69 3.74 9.77];
v=pi*((dd/2).^2).*ll,ro=mm./v
```

Substance	Mass (g)	Diameter (cm)	Length (cm)
Aluminum	51.5	2.52	3.75
Copper	56.3	1.23	5.06
Brass	94.4	1.54	5.69
Tin	69.1	1.75	3.74
Iron	216.1	1.89	9.77

**Q51/** write a code to display following array -to 0 in 0.1 step using for loop?

```
for s = 1.0: -0.1: 0.0
disp(s)
end
```

**Q52/**which of the following statements shows the result of executing, in the Command Window, of the line: `>>sqrt(sin(-pi/2)); sin=size(1:5)`

- a. wrong result    b. 1    c. 1 5    d. i    e. none of above

**Q53/** What is the value of JJ after the Matlab code below executes?

```
jj=0;
for ii=1:2:5
jj=jj+ii;
end
jj
```

- a. 3    b. 12    c. 11    d. 6    e. 5

**Q54/** Explain the following briefly:

1. pwd    2. length    3. mean    4. vectorize

**Q55/** Write a function that calculate hyperbolic-sines [ $\sinh(x) = \frac{e^x - e^{-x}}{2}$ ] for the following data 43,28,38,48,33?

```
function y=hsin(x)
y=(exp(x)-exp(-x))/2;
end
clc, clear all,close all
x=28:5:48
y=hsin(x)
```

**Q56/** Write a program to find volumes of empty spheres  $[V=4\pi (r_o^3-r_i^3)/3]$  that have following internal (5,12,19,26,33), and outer diameters (12,20,25,33,45) ?

```
clc, clear all, close all
rin=(5:7:33)/2, rout=[12 20 25 33 45]/2
v=4*pi/3*(rout.^3-rin.^3)
```

**Q57/** Find the integration for the following function  $x^3+4$  ?

```
clc, clear all, close all
syms x, ff=@(x) x^3+4
int(ff, x)
```

**Q58/** Find the temperatures in Celsius and kelvin for the following temperatures in Fahrenheit 64,46,40,52,34,58 by using following equations:  $C = \frac{5}{9}(F - 32)$ ,  $K = C + 273.15$

```
function [ce,ke]=confah(ff)          clc, clear all, close all
ce=(5/9)*(ff-32);                    ff=34:6:64
ke=ce+273.15;                        [ce,ke]=confah(ff)
end
```

**Q59/** Write a function for  $y=2x^3+5$  for x range from 0 to 10 in step 0.01?

<pre>function y=eqx3(x) y=2*x.^3+5; end</pre>	<pre>clc, clear all, close all x=0:0.01:10; y=eqx3(x) plot(x,y)</pre>
---	---

**Q60/** Make the following matrix and add to it -5?

$$a = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

```
clc, clear all, close all
a=eye(3), b=a-5
```

**Q61/** Compute arithmetic operations (+, -, ×, ÷) on the  $z_1=2+5j$ ,  $z_2=5-10j$ ?

```
z1=2+i*5; z2=5-i*10;
zadd=z1+z2, zsub=z1-z2
zmult=z1*z2, zdiv=z1/z2
```

**Q62/** find averages for the following data: 38, 2, 20, 11, 29

```
clc, clear all close all
x=2:9:38; av=mean(x)
```

**Q63/** using function m-file to solve following equation for  $\mu=0.005$ ,  $\sigma=0.5$ , x from -5 to 5 with step 0.01, and finally draw the results:

$$y = e^{-\frac{x-\mu}{\sigma\sqrt{2}}} / \sigma\sqrt{2\pi}$$

<pre>function y =ch311a(x,mu,sig) a1=exp(-(x-mu)/(sig*sqrt(2))); a2=sig*sqrt(2*pi); y=a1/a2;end</pre>	<pre>clc, clear all, close all x=-5:0.1:5; mu=0.005; sig=0.5; y=ch311a(x, mu, sig); figure, plot(x,y)</pre>
---	---



**Q64/** Compute following equation by inline function for a=5 and x=3,  $y=\sin(ax)$

```
clc,clear all,close all
g = inline('sin(a*x)', 'x', 'a'),g(3,5)
```

**Q65/** Numerically approximate the solution of first order differential equation:

$$\frac{dy}{dx} = xy^2 + y; \quad y(0) = 1,$$

on the interval  $x \in [0, .5]$ .

```
clc,clear all,close all
fa=inline('x*y^2+y')
[x,y]=ode45(fa,[0 0.5],1);
figure,plot(x,y)
```

**Q66/** Graph  $\sin(5x/12)$  from 0 to  $2\pi$ ?

**Q67/** Draw  $\sin(x)$ ,  $\sin(2x)$ , and  $\sin(3x)$  on the same set of axes (  $x$ : 0 to  $2\pi$  in 0.01 steps?)

$$r = \sqrt{x^2 + y^2} \quad \theta = \tan^{-1} y/x$$

**Q68/** Find polar coordinates (r,θ) for the following Cartesian coordinates(x,y):  
(2,5),(8,10),(14,15)

<pre>function [r, theta] = polcr(x, y) % polarcoordinates(x, y) returns % the polar coordinates % of the point with rectangular %coordinates (x, y). r = sqrt(x.^2 + y.^2); theta = atan2(y,x); end</pre>	<pre>clc,clear all,close all x=2:6:14; y=5:5:15; [r,theta]=polarcoordinates(x,y)</pre>
---	--

**Q69/** Find the velocity of sounds for the following temperatures (11,111,211,273) °C using

m-function:  $C = 331 \sqrt{\frac{273+T}{273}}$

<pre>function y=haq4c4(x) y=331*sqrt((273+x)/273); end</pre>	<pre>clc,clear all,close all t=[11 111 211 273]; cc=haq4c4(t)</pre>
--	---

**Q70/** Find the coefficient of linear expansion for  $L_0=600$  mm by using data of table and

following equation:  $\eta = \frac{1}{L_0} \frac{\Delta L}{\Delta \theta}$

$\Delta\theta/^\circ\text{C}$	13	22	32	41	50
$\Delta L/\text{mm}$	0.1	0.2	0.3	0.4	0.5

```
clc,clear all,close all
l0=600;d1=0.1:0.1:0.5;
dc=[13 22 32 41 50];
l1=1/l0*d1./dc
```

**Q71/** Take the average of velocity of sounds by using following table and equation:  $C=4Lf$

f/Hz	288	320	341.33	384	426
L/cm	28.75	26.1	23.25	21.05	18.3

```
clc,clear all,close all
```

```
f=[288 320 341.33 384 426];
l1=[28.75 26.1 23.25 21.05 18.3];
C1=4*l1.*f, C=mean(C1)
```

**Q72/** Draw the functions  $\sin(x)$  and  $e^{-x}$  for  $x$  change from 0 to 10 on same curve and find first solution of the:  $\sin(x)=e^{-x}$

```
clc,clear all,close all
ezplot('exp(-x)', [0 10]), hold on
ezplot('sin(x)', [0 10]), hold off
h = @(x) exp(-x) - sin(x); fzero(h, 0.5)
```

**Q73/** Find the average of gravities that obtained using following table and equation:

L/cm	40	45	50	55	60	65
T <sup>2</sup> /s <sup>2</sup>	1.61	1.82	1.99	2.17	2.75	2.88

$$g = 2\pi \sqrt{\frac{L}{T}}$$

```
clc,clear all,close all
l1=40:5:65;t=[1.61 1.82 1.99 2.17 2.75 2.88];
g1=4*pi^2*l1./t, g=mean(g1)
```

**Q74/** Make matrix A and extract third row, second column and 'y'?

```
clc,clear all,close all
syms w x y z
a=[1:4;2 6 7 8;w x y z]
b=a(3,:), c=a(:,2), d=a(3,3)
```

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 6 & 7 & 8 \\ w & x & y & z \end{bmatrix}$$

**Q75/** find the average of gravities that obtained using following table and equation:  $g=4\pi^2\Delta x/T^2$

$\Delta x/cm$	25	27.8	31	33.8	36.6
T <sup>2</sup> /s <sup>2</sup>	240.3	294.12	329.4	404.01	441

**Q76/** find the average of gravities that obtained using following table and equation:

$$g=4\pi^2m/T^2$$

m/gm	40	50	60	70	80
T <sup>2</sup> /s <sup>2</sup>	240.3	294.12	329.4	404.01	441

**Q77/** Extract the matrix B from the matrix A?  $B = \begin{pmatrix} 5 & 6 \\ 9 & 10 \end{pmatrix}$

$$A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \end{pmatrix}$$

```
clc,clear all,close all
a=[1:4;5:8;9:12], b=a(2:3,1:2)
```

**Q78/** Draw  $\tan \theta$  for  $\theta=-10$  to 10 in step 0.01 and save the resulted curve in jpg format and show the resulted image?

**Q79/** Measurement of time constant and values of C for discharging of capacitor.  $\tau_{ave}=-t/\ln x$ ,  $C=\tau_{ave}/R$  for  $R=100 \Omega$

```
clc,clear all,close all
t=0:10:40;R=100;
x=[3,2,1.5,1.1,0.9].*10^-2;
taw=-t./log(x), tawav=mean(taw), C=tawav/R
```

t(sec)	0	10	20	30	40
x(cm)	3	2	1.5	1.1	0.9

**Q80/** The ionic conductivity of (C) of a crystal is given as a function of temperature (T) by the equation,  $co = e^{\ln c-E/kT}$  where k is Boltzmann constant. Draw the Co versus T (T in Kelvin and C in  $Cx10^7$  mks unit,  $E=2x10^{-19}$  joules,  $k=3.38x10^{-23}$ )

T : 746 805 825 853 875 885 915 952 965 990

CX10<sup>7</sup>: 1.82 2.90 5.85 8.40 19.1 32.7 66.1 120 245 418

```
clc,clear all,close all
t=[746,805,825,853,875];
c=[1.82,2.9,5.85,8.4,19.1]*10^7;
E=2*10^-19;k=3.38*10^-23;
co = exp(log(c)-E./(k*t)),plot(co,t)
```

**Q81/** use two methods to draw two curves on same figure (sin θ and cos θ for θ=-15 to 15 in 0.01 step).

**Q82/** Extract the third row and second column from the following matrix?  $A = \begin{pmatrix} 2 & 7 & 3 \\ 4 & 2 & 1 \\ 8 & 9 & 10 \\ 3 & 2 & 1 \end{pmatrix}$

**Q83/** Measurement of (e/m) by helical coil method: use following equations and parameters to find e/m average? ( $l=10\text{ cm}$ ,  $N=3350$ ,  $\mu_o=4\pi \times 10^{-7}\text{ N m}^2/\text{A}^2$ ,  $L=9\text{ cm}$ ,  $I=1$  to 5 A  $V_a=250,275,300,325,350\text{ v}$ )

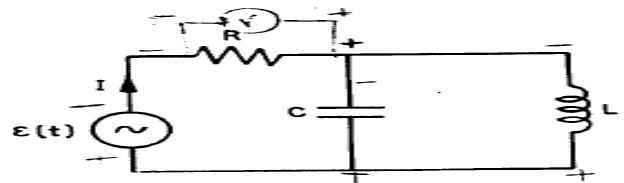
$$B = \frac{\mu_o N I}{l}, \quad e/m = \frac{8\pi^2 V_a}{L^2 B^2}$$

```
function [B,em]=hs(mu,n,ii,l,va,ll)
B=mu*n*ii/l;
em=8*pi^2*va./(ll^2*B.^2);
end
```

```
clc,clear all,close all
mu=4*pi*10^-7;n=3350;l=10*10^-2;
ll=9*10^-2;va=250:25:350;ii=1:5;
[B,em]=hs(mu,n,ii,l,va,ll)
emave=mean(em)
```

**Q84/** find the average of power dissipated for the following circuit if  $R=100\ \Omega$ ,  $C=10\ \mu\text{F}$ ,  $L=2\ \text{mH}$ ,  $f=1$  to  $10\ \text{kHz}$ .

$$\bar{P} = \frac{I_o^2 R}{2} = \frac{\epsilon_o^2 R}{2 \left[ R^2 + \left( \omega L - \frac{1}{\omega C} \right)^2 \right]}$$



```
function y=pdis(eo,R,w,L,C)
a=w*L-1./(w*C);
y=eo^2*R./(2*(R^2+a.^2));
end
```

```
clc,clear all,close all
R=100;C=10*10^-6;L=2*10^-3;
f=(1:10)*10^3;
eo=8.85*10^-12;w=2*pi*f;
p=pdis(eo,R,w,L,C)
pave=mean(p)
```

**Q85/** find e/m and m using following equation and draw e/m versus  $V_a$  and versus  $B$  if you know:  $V_a=200$  to  $300$ ,  $B=100$  to  $200\ \text{mT}$ ,  $L=10\ \text{cm}$

$$\frac{e}{m} = \frac{8\pi V_a}{L^2 B^2}$$

```
Function [em,m]=hag(va,ll,B,ee)
em=8*pi*va./(ll^2*B.^2);
m=ee./em;
end
```

```
clc,clear all,close all
va=200:300;B=(100:200)*10^-3;
L=10*10^-2;ee=1.6e-19
[em,m]=hag(va,L,B,ee)
mave=mean(m)
```

**Q86/** Explain the following briefly:

1. save
2. eig
3. semicolon
4. Contour Plot

**Q87/** What is startup file? How created and what are their functions?

**Q88/** Solve the following equations: a.  $\frac{\partial}{\partial x}(xy^2)$  b.  $\int_0^\pi \int_0^{\sin x} (x^2 + y^2) dy dx$   
 c.  $g = \ln(e) + \ln(e^{3^4})$

**Q89/** For a circular coil of radius R and of n turns, carrying a current I, the magnetic field at a distance x from the coil and along the axis of the coil is given by:

$B(x) = \frac{\mu_0 n I R^2}{2} \frac{1}{(R^2 + x^2)^{3/2}}$  Where  $\mu_0 = 4\pi \times 10^{-7} \text{ Nm}^2/\text{A}^2$ ,  $R = 5 \text{ cm}$ ,  $I = 2 \text{ A}$ ,  $n = 500$ ,  $x = 0$  to  $10 \text{ cm}$  in  $0.2 \text{ step}$ . Draw B versus x?

**Q90/** Find average of the hall coefficients ( $R_H$ ) and majority current density (n) from following equations:  $R_H = V_{HD}/IB$ ,  $n = 1/qR_H$  where  $B = 30 \text{ mT}$ ,  $d = 1 \text{ mm}$ ,  $q = 1.6 \times 10^{-19}$

I(mA)	1	2	3	4	5	6
$V_H$ (v)	0.01	0.07	0.1	0.5	0.9	1.2

**Q91/** what value does the variable q contain after the Matlab code below executes?

$a = [1 \ 3 \ 5]; \quad q = a.*a; \quad q = q + 2;$

- a. [27 11 3]      b. nothing - operation is not possible  
 c. [5 3 1]      d. 17      e. [3 11 27]

**Q92/** Explain the following briefly:

1. ezplot    2. loop    3. semicolon    4. meshgrid

**Q93/** How publish your code with their outputs using diary files? Give an example?

**Q94/** solve the following equations: a.  $xy'+1=y$     b.  $\sum_{k=1}^n \left(\frac{1}{k} - \frac{1}{1+k}\right)$     c.  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$

**Q95/** Retentivity ( $M_o$ ) is the residual magnetization in the sample when the external magnetic field is zero. The system consists of a coil with core ( $l =$  length), and cross-sectional area ( $\alpha =$  area of circle). The magneto-deflector is situated with a distance ( $r$ ) from center of road. Retentivity is calculated as:  $M_o =$

$\frac{4\pi}{\mu_0 \alpha 2l} \frac{(r^2 - l^2/4)^2}{r} B_E \tan \theta_o$

where:  $\mu_0 = 4\pi \times 10^{-7} \text{ Nm}^2/\text{A}^2$ ,  $l = 5 \text{ cm}$ ,  $r = 7 \text{ cm}$ ,  $\alpha =$  area of circle with diameter 1 cm,  $B_E = 3.53 \times 10^{-5} \text{ T}$ , Draw  $M_o$  versus I (using function)?

I(A)	0.3	0.6	0.9	1.2	1.5
$\theta_o$	5	23	32	43	69

**Q96/** find  $\bar{x}$  and covariance ( $\sigma^2$ ) using following equations for the following data (using function): 12, 24, 8, 36, 44, 16, 28, 20, 32, 40

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i \quad \sigma^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

**Q97/ a.** Executing in the Command Window the following code

```
a = ones(3,4);    b = a(4,3), size(b);    returns
```

a. 1    b. -1    c. 1 1    d. error message    e. none of the above

**b.** What value does the variable q contain after the Matlab code below executes?

```
for q = 1:1:100
c = q^0.5;
end
q = c + 5;
```

a. 15            b. nothing - operation is not possible  
c. c                            d. 100                            e. 105

**Q98/** Find values of  $\rho$  for  $x=14, 10, 6, 2$ :

```
clc,clear all,close all
x=14:-4:2;
ro=(log(x.^2)+x*sin(10)^3)/(x.*exp(-x)-5)
```

**Q99/** Find third solution for the two equations  $y_1=x, y_2=3 \sin(x)$ , in the interval  $-2\pi$  to  $2\pi$  (illustrate their solution on the curve with label)?

```
clc,clear all,close all
x=-2*pi:.01:2*pi;plot(x,x,x,3*sin(x))
title 'two x and 3sin x curve',xlabel 'x',ylabel 'y'
legend('y1=x','y2=3 sin x')
aa=fzero('3*sin(x)-x',2)
y=ginput(1);text(y(1),y(2),{'\leftarrow Third solution' num2str(aa)})
```

**Q100/** Graph following equation (using function):  $\frac{1}{\lambda} = R_{\infty} z^2 \left( \frac{1}{n_i^2} - \frac{1}{n_f^2} \right)$

Where  $R_{\infty} = 1.097 \times 10^7$ ,  $n_i=2$ ;  $z$  from 1 to 4 and  $n_f$  from 3 to 6.

```
clc,clear all,close all
rinf=1.097e7;z=1:4;ni=2;nf=3:6;
[z,nf]=meshgrid(z,nf);
laminv=@(rinf,z,ni,nf) rinf*z.^2.*(1/ni^2-1./nf.^2);
surf(z,nf,1./laminv(rinf,z,ni,nf))
title '\lambda vs z & nf',xlabel 'z',ylabel 'nf',zlabel '\lambda'
```

**Q101/** Find values of  $\sigma$  for  $x=2.3, y=4, 16, 38, 50$ :

```
clc,clear all,close all
x=2.3;y=4:12:50;
sig=(y.*exp(y*sqrt(x))-log(y))./(y*sin(x)^3+x*y.^3)
```

**Q102/** Find Energy gap  $E_g$  for typical semiconductor  $\ln \sigma = \ln \sigma_0 + \frac{E_g}{2k} \cdot \frac{1}{T}$

(using graph) from following data and equation:

$$k = 1.38 \times 10^{-23} \text{ m}^2 \cdot \text{kgm/s}^2 \cdot \text{k}^0, T = 300-460 \text{ k}, \text{ and } \ln \sigma = 2-3.$$

```
clc,clear all,close all
k=1.38e-23;t=300:15:460;lnsigma=2:.1:3;
plot(1./t,lnsigma),title 'Ln \sigma vs 1/T',xlabel '1/T'
ylabel 'Ln \sigma'
y=ginput(2),slope=(y(1,2)-y(2,2))/(y(1,1)-y(2,1)),eg=2*k*slope
```

**Q103/** For a circular coil of radius R and of n turns, carrying a current I, the magnetic field at a distance x from the coil and along the axis of the coil is given by:

$$B = \frac{\mu_0 n I R^2}{2} \frac{1}{(R^2 + x^2)^{3/2}}$$

Where  $\mu_0 = 4\pi \times 10^{-7} \text{ Nm}^2 / \text{A}^2$ ,  $R = 5 \text{ cm}$ ,  $I = 0.5 \text{ to } 3.5 \text{ A}$ ,  $n = 500$ ,  $x = 0 \text{ to } 10$ . Draw and label B(using function)?

```
clc,clear all,close all
muo= 4*pi*10^-7;R=5e-2;I=0.5:0.1:3.5;n=500;x=(0:10).*1e-2;
[I,x]=meshgrid(I,x);
mlab=@(muo,n,I,R,x) muo*n*I*R^2/2./(R^2+x.^2).^ (3/2);
B=mlab(muo,n,I,R,x);surf(I,x,B),title 'B vs I & x'
xlabel 'I (A)',ylabel 'x (m)',zlabel 'B (T)'
```

**Q104/** Find values of  $\beta$  for  $y=6$ , and  $x=3, 4, 18, 21, 35$ :

$$\beta = yx^4 \log xy^2 + y \sin^3 x/x \ln xy - 2$$

```
clc,clear all,close all
y=6;x=[3,4,18,21,35];
beta=(y*x.^4.*log10(y*x.^2)+y*sin(x).^3)./(x.*log(x*y)-2)
```

**Q105/** Graph  $\lambda$  from following data and equation ( $\lambda_0 = 400-500 \text{ \AA}$ ,  $h = 6.63 \times 10^{-34}$ ,

$$m_0 = 9.1 \times 10^{-27}, c = 3 \times 10^8, \text{ and } \phi = 0-\pi): \lambda - \lambda_0 = \frac{h}{m_0 c} (1 - \cos \phi)$$

```
clc,clear all,close all
lamo=(400:10:500)*1e-10;h=6.63e-34;mo=9.1e-27;cc=3e8;
phi=(0:0.1:1)*pi;[phi,lamo]=meshgrid(phi,lamo);
lam=lamo+(h/(mo*cc))*(1-cos(phi));surf(phi,lamo,lam)
title '\lambda vs \phi & \lambda_0',xlabel '\phi',
ylabel '\lambda_0',zlabel '\lambda'
```

**Q106/** Graph  $E_n$  from following equation (using function):  $E_n = \frac{-k \times e^2 \times z^2}{1.06 \times 10^{-10} \times n^2}$

Where  $k = 1.38 \times 10^{-23}$ ,  $e = 1.6 \times 10^{-19}$ ,  $z$  and  $n$  have range from 1 to 4.

```
clc,clear all,close all
k=1.38e-23;ee=1.6e-19;z=1:4;n=1:4;
en=@(k,ee,z,n) ((-k*ee^2)/(2*0.53e-10))*(z.^2./n.^2);
[z,n]=meshgrid(z,n);surf(z,n,en(k,ee,z,n))
title 'E_n vs z & n',xlabel 'z',ylabel 'n',zlabel 'E_n'
```

**Q107/** Compute the following quantity:  $\gamma = \frac{ab}{c} \frac{a+b \sin^2(a)}{\sqrt{ab}} + \frac{\sqrt{\pi b}}{e^{3 \ln b c}}$

For a=1, b=2, and c=2-12.

```
clc,clear all
a=1;b=2;c=2:12;
gama=a*b./c*(a+b*sin(a)^2)/sqrt(a*b)+sqrt(pi*b)./(exp(3*log(b))*c)
```

**Q108/** The coefficient of friction,  $\mu$ , can be

determined by:  $\mu = \frac{F}{mg}$   $g = (9.81 \frac{m}{s^2})$

m (Kg)	2	4	5	10	20	50
F (N)	12.5	23.5	30	61	117	294

Draw and label coefficient of friction  $\mu$ ?

```
clc,clear all,close all
m=[2,4,5,10,20,50];g=9.81;
f=[12.5,23.5,30,61,117,294];
mu=f./(m*g);plot3(m,f,mu)
title 'mu versus m and f',xlabel 'm(kg)',ylabel 'f(Nt)',zlabel 'mu'
```

**Q109/** Computes (using function) neglect b, then find value of b through drawing s?

$$s = \frac{p(\alpha+y^2)}{y-\ln(\delta)} + b \quad \text{where } y=12.3, \delta = 2.67, \alpha = 1.6, \text{ and } p = -8,4,16,28,40,52.$$

```
clc,clear all,close all
y=12.3;delta=2.67;alpha=1.6;p=-4:12:52;
s=@(p,alpha,y,delta) (p*(alpha+y^2))/(y-log(delta));
plot(p,s(p,alpha,y,delta)),title 's versus p'
xlabel 'p',ylabel 's',g=ginput(1),b=g(2)
```

**Q110/** Find values of  $\alpha$  for x=4, 8, 21, 55:  $\alpha = \frac{x^2+x \sin^3 10}{x e^{-x}-5e^{-x}}$

```
clc,clear all,close all
x=[4,8,21,55]; alpha=(x.^2+x*sin(10)^3)./(x.*exp(-x)-5*exp(-x))
```

**Q111/** Compute average of 2 to 10 using function m-file.

```
function y=ave(x)
y=sum(x)/length(x);
-----
clc,clear all,close all
x=2:10;y=ave(x)
```

**Q112/** Make two graphs in the same figure to plot the following two functions:

$$f = 3t^2 + 2t - 0.5$$

$$g = 2t \cos(t)$$

Where the variable t varies from 0 to 10.5

1. Graph and label f (in blue 0) and g (in red \*) versus t
2. Graph and label g versus f

```
clc,clear all,close all
t=0:0.1:10.5;f=3*t.^2 + 2*t - 0.5; g = 2*t.*cos(t);
subplot(1,2,1),plot(t,f,'bo',t,g,'r*')
xlabel 't',ylabel 'f & g', title 'f & g vs t'
subplot(1,2,2),plot(f,g)
xlabel 'f',ylabel 'g', title 'g vs f'
```

**Q113/** Write a for loop to compute the squares of multiplying all integers from 2 to 20:

$$2^2 \times 3^2 \times 4^2 \times \dots 20^2$$

```

clc,clear all,close all
f = 1;
for n = 2:20;
    f = f*n^2;
end
f

```

Q114/ Find values of  $\rho$  for  $y=4, 16, 20, 52$ :  $\rho = \frac{ye^{y\sqrt{\pi}} - \ln y}{y \sin^3(\pi) + y^3}$

```

clc,clear all,close all
y=[4,16,20,52];
ro=(y.*exp(y*sqrt(pi))-log(y))./(y*sin(pi)^3+y.^3)

```

Q115/ Crop the head of Quala picture.

```

clc,clear all,close all
rgbpic = imread('HumanEar.png');
figure,image(rgbpic)
newpic = rgbpic(60:200,200:350,:);
figure,image(newpic) %crop

```

Q116/ For a circular coil of radius  $R$  and of  $n$  turns, carrying a current  $I$ , the magnetic field at a distance  $x$  from the coil and along the axis of the coil is given by:

$$B(x) = \frac{\mu_0 n I R^2}{2} \frac{1}{(R^2 + x^2)^{3/2}} \quad \text{Where } \mu_0 = 4\pi \times 10^{-7} \text{ Nm}^2 / \text{A}^2, R=5 \text{ cm}, I= 0.5 \text{ to } 3.5 \text{ A}, n=500,$$

$x=0$  to  $10$ . Draw and label  $B$ (using function m-file)?

```

function y=mlabb3(mu0,n,I,R,x)
y=mu0*n*I*R^2/2./(R^2+x.^2).^ (3/2);
-----
clc,clear all,close all
mu0= 4*pi*10^-7;R=5e-2;I=0.5:0.1:3.5;n=500;x=(0:10).*1e-2;
[I,x]=meshgrid(I,x);
B=mlabb3(mu0,n,I,R,x);mesh(I,x,B),title 'B vs I & x'
xlabel 'I(A)',ylabel 'x(m)',zlabel 'B(T)'

```

Q117/ Write a for loop to compute multiplying of square of all of the odd integers from 1 to

$$31: \quad 1^2 \times 3^2 \times 5^2 \times \dots 31^2$$

```

clc,clear all,close all % method A
n=3:2:31;prod(n.^2)
-----
clc,clear all,close all %method B
f = 1;
for n = 3:2:31;
    f = f*n^2;
end
f

```

Q118/ Find values of  $\beta$  for  $x=3, 4, 18, 21, 35$ :  $\beta = \frac{x^4 \log x^2 + x \sin^3 x}{x \ln x - 2e^{-x}}$

```

clc,clear all,close all
x=[3,4,18,21,35];
beta=(x.^4.*log10(x.^2)+x.*sin(x).^3)./(x.*log(x)-2*exp(-x))

```



**Q119/** Find  $R_H$  from following equation (from graph):

Where  $I=12$  A,  $d=18 \mu\text{m}$ ,  $B$  from  $-200$  to  $200$  and  $U_H$  from  $-8$  to  $8$ .

```
clc,clear all,close all
I=12;d=18e-6;B=(-200:25:200).*1e-6;uh=(-8:8).*1e-3;
plot(B,uh),title 'U_H vs B',xlabel 'B(T)',ylabel 'U_H(V)',zlabel 'B(T)'
g=ginput(2);slope=(g(1,2)-g(2,2))/(g(1,1)-g(2,1)), rh=d/I*slope
```

**Q120/** Write a for loop to compute the following (function m-file), for  $x=2$  and  $5$ :

$$5^x \times 6^x \times 7^x \times \dots 15^x$$

```
function y=cq4(x)
y= 1;
for n = 5:15;
    y = f*n^x;
end
y
```

---

```
clc,clear all
x=2;x1=5;y=cq4(x),y1=cq4(x1)
```

**Q121/** Compute the following quantity:  $\alpha = \frac{\log(b)}{c-b} \frac{a+b \sin^2(a)}{\sqrt{abe^{-\pi b}}}$  for  $a=1$ ,  $b=2$ , and  $c=12-32$ .

```
clc,clear all
a=1;b=2;c=12:32;
alpha=log10(b)./(c-b)*(a+b*sin(a)^2/sqrt(a*b*exp(-pi*b)))
```

**Q122/** Compute  $\tau$  (using function), then draw and label it:  $\tau = \frac{p(\alpha+y^2)}{y-\ln(\delta)}$

where  $y=12.3$ ,  $\delta = 2.67$ ,  $\alpha = 1.6, 2.4, 7, 14.7, 24$ , and  $p = 8, 41, 56, 78, 140$ .

```
clc,clear all
y=12.3;delta=2.67;alpha=[1.6, 2.4, 7, 14.7, 24];p=[8,41,56,78,140];
tau=q2a(p,alpha,y,delta);
plot3(p,alpha,tau),title '\tau versus p & \alpha'
xlabel 'p',ylabel '\alpha',zlabel '\tau'
```

**123/** Compute the following: a.  $2^3, 4^6, 6^9, 8^{12}, 10^{15}$  b.  $3^2 \times 4^2 \times 5^2 \times \dots 20^2$

```
clc,clear all % sol. a
format shortg,x=2:2:10;n=3:3:15;x.^n
y=1; % sol. b
for i=3:20
    y=y*i^2;
end
y
```

**Q124/** Compute the following quantity:  $\sigma = \frac{xy}{y+e^{-\pi\sqrt{x}}} - \frac{\ln y}{y-\sin^3(x)}$  for  $x=10$ , and  $y=3-15$ .

```
clc,clear all,close all
x=10;y=3:15;
sigma=x*y./(y+exp(-pi*sqrt(x)))-log(y)./(y-sin(x)^3)
```

**Q125/** Write a matlab function for following equation:  $\beta = ae^{-4t} \cos 5t - (a+1)e^{-3t} \sin 2t$

Where  $t$  and  $a$  in the  $0 - 5$  interval. Draw and label  $\beta$ ?

```

clc,clear all,close all
t=0:0.1:5;a=t;
[t,a]=meshgrid(t,a);
beta=q2b(t,a);surf(t,a,beta),title '\beta vs t & a',xlabel 't'
ylabel 'a',zlabel '\beta'

```

**Q126/** Compute the following: a.  $4^{20}, 6^{16}, 8^{12}, 10^8, 12^4$  b.  $3 + 3/3 + 3/9 + \dots + 3/3^{10}$

```

clc,clear all
format shortg,x=4:2:12;n=20:-4:4;x.^n % sol. a
y=0; % sol. b
for i=0:10
    y=y+3/3^i;
end
y

```

**Q127/** Explain the following briefly:

1. Matlab
2. Exact answer
3. whos
4. factor
5. Aborting Calculations

**Q128/a.** Describe the naming rules for variables and functions?

**b.** Find solution of following equations:

1.  $x^2 - y^2 = (x - y)(x + y)$     2.  $b = (x - y)(x - y)$  expand? factor?

1. >> syms x y    >> a=x^2-y^2    >> expand(a)

2. >> syms x y    >> b=(x-y)\*(x-y) >> expand(b)    ans = x^2 - 2\*x\*y + y^2

>> factor(ans)    ans = (x - y)^2

**Q129/** Compute addition and multiplication of matrix A with B and A with C ?

$$A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 6 & 7 & 8 \\ w & x & y & z \end{pmatrix} \quad B = \begin{pmatrix} 12 & 9 & 6 & 3 \\ 2.5 & 5 & 7.5 & 10 \\ 7 & 17 & 21 & 28 \end{pmatrix} \quad c = \begin{pmatrix} 9 & 10 & h & d \\ 26 & 19 & 12 & 5 \\ r & t & 2 & -3 \\ 5.9 & 4.8 & 3.7 & 2.6 \end{pmatrix}$$

```

>>clc,clear all, close all
>> syms w x y z h d r t
>>a=[1:4;2,6:8;w x y z];b=[12:-3:3;2.5:2.5:10;7 17 21 28];
>>c=[9,10,h,d;26:-7:5;r t 2 -3;5.9:-1.1:2.6];
>>abp=a+b,acm=a*c
>>abm=a*b,acp=a+c % not performed

```

**Q130/** Solve following equation using function (both types) for  $x=45,37,29,21$  and  $y=4, 16,$

11, 22: 
$$n = \frac{ye^{x\sqrt{\pi}} - \ln xy}{y \sin(\pi x) + xy^3}$$

```

>>clc,clear all, close all
>>x=45:-8:21;y=[4,16,11,22];
>>n=@(x,y) (y.*exp(x*sqrt(pi))-log(x.*y))./(y.*sin(pi*x)+x.*y.^3);
>>n1=inline('(y.*exp(x*sqrt(pi))-log(x.*y))./(y.*sin(pi*x)+...
x.*y.^3)','x','y');
>>an=n(x,y),an1=n1(x,y)

```

**Q131/** 1. What value does the variable q contain after the Matlab code below executes?

>>a = [1 3 5]; q = a.\*a; q = q + 2;

- a. [27 11 3]
- b. nothing - operation is not possible
- c. [5 3 1]
- d. 17
- e. [3 11 27]

2. what value does the variable q contain after the Matlab code below executes?

```
>> q = a.*a; a = [4 7 15]; >> q = 2*q + 2;
```

- a. [12 25 57]      b. nothing - operation is not possible  
c. [5 23 79]      d.87      e. [83 311 927]

Q132/ Explain the following briefly:

1. Simplify    2. Hold on    3. Axis tight    4. Factor    5. Parametric surfaces

Q133/a. Describe the different types of MATLAB data?

b. Find result of z using symbolic expression:  $z = \frac{10 - e^{\frac{2\pi - x}{x^2 - 5}}}{\sin(5x + 3) + 4}$  where x= 3.

Q134/ Make a function (both methods) for the definition of the normal distribution that often called z distribution.

$$z = \frac{1}{\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

Where  $\mu$  and  $\sigma$  are fourth and seventh numbers of  $x=0$  to 10.

Q135/ Draw and label the coefficient of linear expansion for  $L_0=6$  cm by using data of table

$\Delta\theta/^\circ\text{C}$	13	22	32	41	50
$\Delta L/\text{mm}$	0.1	0.2	0.3	0.4	0.5

and following equation:  $\eta = \frac{1}{L_0} \frac{\Delta L}{\Delta\theta}$

Q136/1. Which of the following statements is correct?

- a. Function “clear all” clears only the scalar variables  
b. Function “clc” clears all variables  
c. Function “clc” clears only constants  
d. Function “clear a” clears all variables of the type “array”

2. Which of the following statements shows the result of executing:

```
>> sqrt(sin(-pi/2)) ; sin = size(1:5)
```

- a. error message    b. 1    c. 1 5    d. I    e. none of above

Q137/ Explain the following briefly:

1. Semicolon    2. Undock    3. Subs    4. Factor    5. Variables Window

Q138/ a. Describe the naming rules for variables and functions?

b. Find solution of following equations:

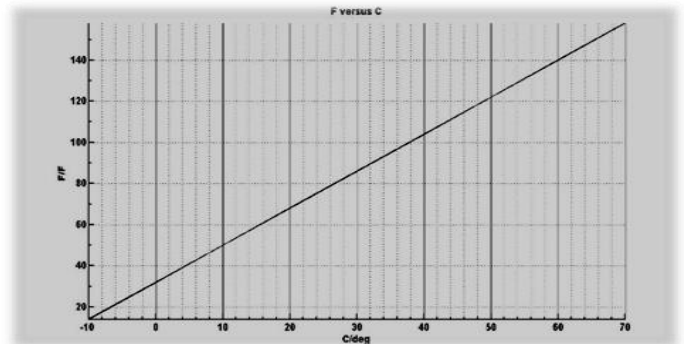
1.  $u^2 - (u+v)^2 = -2uv - v^2$     2.  $3x + 2y - 9z = -65$ ,  $-9x + 5y + 2z = 16$ ,  $6x + 7y + 3z = 5$   
3.  $(x - 1)(x + 4) = x^2 + 3x - 4$

1. `>> syms u v >> collect(u^2 - (u+v)^2)`  
    `>> expand(u^2 - (u+v)^2) >> simplify(u^2 - (u+v)^2)`  
2. `clc, clear all, close all,`

```
>> syms x y z
>> [x,y,z]=solve('3*x+2*y-9*z=-65','-9*x +5*y+2*z =16',...
    '6*x +7*y-3*z=5')
>> double(x), double(y), double(z)
3. >> syms x >> expand((x-1)*(x+4)) >> collect((x-1)*(x+4))
```

**Q139/ a.** Write a code program to obtain beside curve, then find slope and intersection.

```
cc=-10:11:60;ff=20:20:140;
plot(cc,ff),title('F versus C')
xlabel('C/deg'), ylabel('F')
g=ginput(3),slope=(g(1,2)-...
    g(2,2))/(g(1,1)-g(2,1)),b=g(3,2)
```



**b.** for the following data, determine the Euclidean distance  $d$  from  $x$  to each row of  $p$ (function method)( $m$ : rows number)

$$x = (14 \quad 9) \quad p = \begin{pmatrix} 8 & 4 \\ 12 & 5 \\ 6 & 8 \end{pmatrix} \quad d = \sqrt{(x_1 - p_{m,1})^2 + (x_2 - p_{m,2})^2}$$

```
x=[13 5];p1=[2 4];p2=[3 7];p3=[9 4];
dd=@(x,p) sqrt((x(1)-p(1))^2+(x(2)-p(2))^2)
dd(x,p1),dd(x,p2),dd(x,p3)
```

**Q140/ a.** for the following data, which operations are correct:

```
>> a=[1;2;3];b=[4;5;6];c=[7;8;9];A=[a,b,c];B=[a,b];
```

1.  $ab=a+b$     2.  $apb=a*b$     3.  $aib=a'*b$     4.  $AdB=A.*B$     5.  $BA=B*A$

**b.** Draw and label the normal distribution (often called  $z$  distribution):

$$z = \frac{1}{\sqrt{2\pi}} e^{-y^2/2} \quad \text{where } y = x - \mu/\sigma \quad \text{and } \mu=5, \sigma=0.1 \text{ to } 0.5, \text{ and } x=0.7 \text{ to } 10.5?$$

**c.** Which MATLAB statement is correct for obtaining  $y$  with  $x$  are from 0 to 6?

$$y = x \cos^2 x + \frac{e^{-\sin x}}{4 + \cos x}$$

A.  $y = x*\cos^2(x) .+ \exp(-\sin(x))/(4 + \cos(x))$     B.  $y = x.*\cos(x).^2 + \exp(-\sin(x))./(4 + \cos(x))$

C.  $y = x.*\cos(x)^2 + \exp(-\sin(x))./(4 + \cos(x))$     D.  $y = x*\cos(x) ^2.+ e^(-\sin(x))./(4 + \cos(x))$

E. None of these will work with that definition of  $x$ .

**Q141/** Explain the following briefly:

1. Matlab    2. Arrows key    3.subs    4.gcf    5.Parametric Plots

**Q142/ a.** Describe the different types of MATLAB data?

**b.** Find solution of following equations:

1.  $2x - \ln y = 1$  for  $y$  in terms of  $x$

2. 
$$\begin{aligned} 3x + 2y - 9z &= -65 \\ -9x + 5y + 2z &= 16 \\ 6x + 7y + 3z &= 5 \end{aligned}$$

**Q143/** Make a curve (with labeling) of  $z = e^{-\frac{2\pi-y}{x^2-5}} \sin(5xy + 3)$  where  $x$  and  $y$  are 0-20 and change setting of the curve to be as follow  $0 \leq x \leq 5, -1 \leq y \leq 1, -5 \leq z \leq 5$ ?

**Q144/a.** Compute addition and multiplication of following matrix with their transpose?

b. Executing the following code

`>>y = a + b, a = 2; b = sqrt(-4);`

a.  $2 + 2i$

b.  $2 - 2i$

c. error message

d. NaN (it means not a number)

e. none of the above

**Q145/** Explain the following briefly:

1. Legend 2. Arrows key 3. Undock 4. Variables window 5. Sample rate

**Q146/ a.** In MATLAB, a color image with height  $h$  pixels and width  $w$  pixels is generally stored in one of two ways. Explain them?

b. Find result of  $z$  using symbolic expression:  $z = \frac{10 - e^{-\frac{2\pi-x}{x^2-5}}}{\sin(5x+3)+4}$  where  $x = 3$ .

**Q147/** Retentivity ( $M_o$ ) is the residual magnetization in the sample when the external magnetic field is zero. The system consists of a coil with core ( $l$  = length), and cross-sectional area ( $\alpha$  = area of circle). The magneto-deflector is situated with different distances ( $r$ ) from center of road. Retentivity is calculated as:

where: 
$$M_o = \frac{4\pi}{\mu_o \alpha 2l} \frac{(r^2 - l^2/4)^2}{r} B_E \tan \theta_o$$

$\mu_o = 4\pi \times 10^{-7} \text{ Nm}^2 / \text{A}^2, l = 5 \text{ cm}, r = 7 \text{ to } 21 \text{ cm}, \theta_o = 5 \text{ to } 70, \alpha = \text{area of circle with diameter } 1 \text{ cm}, B_E = 3.53 \times 10^{-5} \text{ T},$  Draw and label  $M_o$ ?

**Q148/ 1.** Which line contains valid names?

a. `_xm, m3, abc, a_B`

b. `m3, 3_m, m_3, aB`

c. `AA, for, a-b, ab`

d. `AA, BB, m3, a2B`

e. none of above

2. After executing the following script file in MATLAB

`>> x = [2:4 ; -1:1 ; 1 2 3]; y = [x(2,1) , x(2,2) , x(2,3)] ; size(y')`

the displayed result is

a. 2 2

b. 3 1

c. 2 1

d. 1 3

e. none of above

**Q149/** Find solution of following equations:

$3u + 7v - 2x + 3y - z = 37$

$4u + 3z = 40$

$5x - 4y + z = 12$

$2v + 9x + 4y + 3z = 14$

$5y + 8z = 20$

1.  $2x - \ln y = 1$  for  $y$  in terms of  $x$

2.

**Q150/** What value does the variable q contain after the Matlab code below executes?

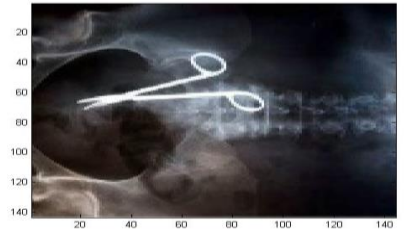
```
for q = 1:100
    c = q^0.5;
end
q = c + 5;
```

- a. 15    b. nothing - operation is not possible    c. c    d. 100    e. 105

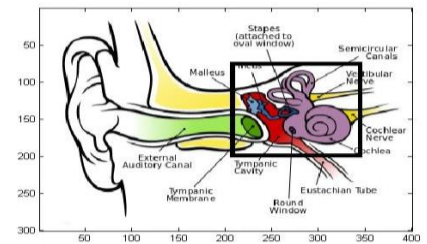
**Q151/ a.** For beside ximage.jpg, crop the medical Scissors?

```
rgbpic=imread('ximage.jpg');figure,image(rgbpic)
newpic = rgbpic(20:100, 18:95, :);
figure,image(newpic) %crop
```

**b.** Compute 8!/5! After making a function for factorial?



**Q152/** Crop the rectangular part of beside human ear picture?



**Q153/ a.** Use the following equations to Graph Band width:

(using function):  $f1 = \frac{\sqrt{R^2 + \frac{4L}{c}} - R}{4\pi L}$        $f2 = \frac{\sqrt{R^2 + \frac{4L}{c}} + R}{4\pi L}$        $B = f2 - f1$

Where R has values (50, 100, 200, 500, 1000 Ω), C has 2 μF and L have 1-5 mH.

**b.** Make two graphs in the same figure to plot the following two functions:

$f = 3t^2 + 2t - 0.5$ ,  $g = 2t \cos(t)$ , where the variable t varies from 0 to 10.5

- Graph and label f (in blue 0) and g (in red \*) versus t
- Graph and label g versus f

**Q154/ a.** Compute following equation (using function):  $\frac{1}{\lambda} = R_{\infty} z^2 \left( \frac{1}{ni^2} - \frac{1}{nf^2} \right)$ , ani= 1 to 10, az= 1 to 104, where  $R_{\infty} = 1.097 \times 10^7$ , ni has second values of ani, z have 4 to 8 values of az, and nf from 3 to 6.

**b.** Find value of ρ for x=14 using symbolic method:  $\rho = \frac{\ln x^2 + x \sin^3 10}{x e^{-x} - 5}$

**c.** Write a code to compute the following sequence: 1, 9, 125, 2401, 59049

**Q155/ a.** Compute λ from following data and equation (λo are first 51 values of 4000-6000

$A^{\circ}$ ,  $h = 6.63 \times 10^{-34}$ ,  $m_o = 9.1 \times 10^{-27}$ ,  $c = 3 \times 10^8$ , and  $\phi$  0-π):  $\lambda - \lambda_o = \frac{h}{m_o c} (1 - \cos \phi)$

**b.** Find values of ρ for y=20 using symbolic method:  $\rho = \frac{y e^{y\sqrt{\pi}} - \ln y}{y \sin^3(\pi) + y^3}$

c. Write a single Matlab expression involving x to produce the output 1, 25, 256, 729, 256, 1?

Q156/ write a code to show following cases for different x values?

One for x=1, two for x=2, three for x=3, Many for all other x

Q157/ a. What are the values of the arrays after execution of each assignment statement for vector s has values 1,-1,3,0,2,0?

1. B = s < 0    2. C (~B) = 5    3. D = s (2:4)    4. E = s

B = 0 1 0 0 0 0    C = 5 0 5 5 5    D = -1 3 0    E = 1 -1 3 0 2 0

b. The function m-file funk1.m is:

```
function z=funk1(x,y)
```

```
z=x/2+y/3;
```

what are values of a after the following code

```
x=3;y=6;z=8; z=funk1(x,y)
```

```
a=[x,y,z]
```

1. a= 3 6 8    2. a= 3 8 3.5    3. a= 3 6 3.5    4. a= 3 6 3

c. Write a code to compute the following:  $2 + 2/3 + 2/9 + \dots + 2/3^{10}$

```
S=0;
```

```
for k=0:10
```

```
S=S+2/3^k;
```

```
end
```

```
S
```

Q158/ Find results for following for:  $a = [4 \ 0 \ -2 \ 7 \ 0]$

1. $a > 0$	2. $a \sim= 0$	3. $(a \geq 0) \& (a \leq 4)$	4. $(a < 0)   (a > 4)$
a1 = 1 0 0 1 0	a2 = 1 0 1 1 0	a3 = 1 1 0 0 1	a4 = 0 0 1 1 0

Q159/ a. A sequence begins with the terms:  $\sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, \dots$

Write a for loop to generate the first 30 terms of this sequence?

```
clc,clear all
```

```
s=1;n=0;
```

```
for k=0:29
```

```
s=s*2^(1/(2*2^k)); s, n=n+1;
```

```
end
```

```
n,s
```

b. What is the output of executing the following Matlab code?

```
k= 0.5; n=0;
```

```
while k ^0.5 < 1.5
```

```
k = k + 1;n=n+1;
```

```
end
```

```
n, k
```

(A) 0, 0.5

(B) 1, 1.5

(C) 2, 2.5

(D) 3, 3.5

c. If x has values 1, 2, 3, 4, write a single Matlab expression involving x to produce the output 1, 2<sup>2</sup>, 3<sup>3</sup>, 4<sup>4</sup>?  
`x=1:4; y=x.^x`

**Q160/** Make a sound using following music notes in double rate. Re, fa, do, me, so

```
clc,clear all,close all
```

```
x=(0:0.1:250)*pi; y=zeros(1,200); z= (0:0.1:1000)*pi;
```

```
xx=[sin(x), y, sin(x), y, sin(x), y, sin(z*4/5), y, ...
```

```
sin(8/9*x), y, sin(8/9*x), y, sin(8/9*x), y, sin(z*3/4)];
```

```
sound(0.7*xx,2*8192); % Re, fa, do, me, so
```

**Q161/** Write a code to make following matrix (1000x5):  $B = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & 2 & 3 & 4 & 5 \end{pmatrix}$

**Q162/** Draw and label Total energy  $E_n$  using following equations (using function m-file):

$$R_\infty = \frac{m_e e^4}{8h^3 \epsilon_0^2 c} \quad E_n = \frac{-R_\infty h c \mu z^2}{m_e n^2}$$

where  $\epsilon_0 = 8.85 \times 10^{-12}$ ,  $h = 6.63 \times 10^{-34}$ ,  $c = 3 \times 10^8$ ,  $m_e = 9.1 \times 10^{-31}$ ,  $e = 1.6 \times 10^{-19}$ ,  $\mu = 4\pi \times 10^{-7}$ , and n, z has 1 to 5 values.

**Q163/** write programs to obtain first and compute second:

1. 81 125 49 9 1

2.  $tn = \frac{t}{n} \frac{t^{n-1}}{n(n-1)!}$  for  $n = 5$   $t = 3$

**Q164/** What is the output of executing the following Matlab code?

```
s=1;
```

```
for k=2:5
```

```
    s=s*(6-k);
```

```
end
```

```
s
```

1. s = 12

2. s = 16

3. s = 18

4. s = 24

**Q165/ a.** Draw and label Orbit radius  $r_n$  using following equations (using function m-file):

$$a_o = \frac{\epsilon_0 h^2}{\pi m_e e^2} \quad r_n = \frac{n^2 a_o m_e}{Z \mu}$$



where  $\epsilon_0=8.85 \times 10^{-12}$ ,  $h=6.63 \times 10^{-34}$ ,  $m_e=9.1 \times 10^{-31}$ ,  $e=1.6 \times 10^{-19}$ ,  $\mu=4\pi \times 10^{-7}$ , and n, z has 1 to 5 values.

Q166/ The function m-file funk1.m is:

```

x = 1;
for ix = 1:2:10
x = 2 * x;
end
x

```

1. x= 22      2. x= 28      3. x= 32      4. x= 36

Q167/Compute following equation: 
$$\rho = \frac{r e^{-\frac{x^2}{2r}} + 3r \ln r x^2}{5r^2 x + r x^2 \sin^3 \pi r x}$$

where x and r have 3.2 and 2 to 20.2, respectively.

Q168/ Draw and label Force F from following equations using function m-file:

$$z = 4\pi\epsilon_0 \qquad F = \frac{1}{z} \frac{q_1 q_2}{3r^2}$$

Where  $\epsilon_0$ ,  $q_1$ ,  $q_2$ , and r have values  $8.85 \times 10^{-12}$ ,  $1.6 \times 10^{-19}$ ,  $2q_1$  to  $20q_1$ , and 5 to 13, respectively.

Q169/ Write a program to define d vector as 1, 4, 9, 16 and use it as input for following equations, finally draw and label equations beside each other:

$$y1=d^2+3 \qquad y2 = \frac{4e^{-2d}}{1+d^2} \qquad y3 = \log(2d)/3d^2$$

Q170/ Compute following equation for y (2.3) and k (3 to 19.1): 
$$\alpha = \frac{ky^2 \log ky + 3y e^{-\frac{k^2 y}{2k}}}{6k^2 \cos^3 \pi k^2 y}$$

Q171/ Write a program to define k vector as 1, 9, 125, 2401, 59049 and use it as input for following equations, finally draw and label equations over each other:

$$f1=k^3 \ln(k)+k^2 \cos(k) \qquad f2 = \frac{k e^{\sqrt{\pi}}}{k \sin(\pi)+k^2} \qquad f3=k^2 \log(k^2)-k^3 \sin(k)$$

Q172/ Draw and label energy E from following equation using function m-file:

$$\lambda - \lambda_o = \frac{h}{m_o c} (1 - \cos \Phi) \qquad E = \frac{hc}{\lambda} \qquad s = \begin{pmatrix} 2 & 4 & 6 & 8 \\ 10 & 7.8 & 5.6 & 3.4 \\ 11 & 12 & 18 & 25 \end{pmatrix}$$

where  $\lambda_0$ ,  $h$  and  $c$  have values  $4000 \text{ \AA}$ ,  $6.63 \times 10^{-34}$  and  $3 \times 10^8$ , respectively.  $m_0$  has  $1.9 \times 10^{-27}$  to  $20 \times 10^{-27}$  and  $\Phi$  is first row of  $s$ .

**Q173/** Draw and label following equations over each other (using function):

$$x = 2 \left[ 1 - e^{\frac{u}{6\pi}} \right] \cos u \cos^2 \left( \frac{v}{2} \right) \quad z = 1 - e^{\frac{u}{3\pi}} - \sin v + e^{\frac{u}{6\pi}} \sin v$$

where  $0 \leq u \leq 6\pi$  and  $0 \leq v \leq 2\pi$ .

**Q174/** The sum of the squares of the integers from 1 to  $n$  is given by the formula

$$n(n + 1)(2n + 1)/6 :$$

1) Use the formula to determine the sum of the squares of the integers from 1 to 20?  $n=20; s1=n*(n + 1)*(2*n + 1)/6$

2) Use vector method to find same result?  $s2=sum((1:20).^2)$

**Q175/** Write a single Matlab expression involving  $x$  to produce the output 1, 25, 256, 729, 256, 1

**Q176/** You are given following vectors:  $u = \begin{pmatrix} 2 \\ 1 \\ 1 \\ 1 \end{pmatrix} \quad v = \begin{pmatrix} 1/2 \\ 1 \\ 0 \\ 0 \end{pmatrix}$

Choose the allowed operations of  $w$ :

(a)  $w = u * v'$  (b)  $w = u * v$  (c)  $w = u + v'$  (d)  $w = u + v$

**Q177/** Draw and label relativistic wavelength  $\lambda$  (using function) from following data and equation ( $m_0$  are  $1.9 \times 10^{-31}$ - $10 \times 10^{-31}$  kgm,  $h=6.63 \times 10^{-34}$ ,  $v$  have  $0.1c$ - $0.95c$ , and

$$c=3 \times 10^8: (20 \text{ deg.}) \quad \lambda = \frac{h}{m_0 v} \sqrt{1 - \frac{v^2}{c^2}}$$

**Q178/a.** Write a single Matlab expression involving  $x$  to produce the output:

$$10 \quad 64 \quad 216 \quad 256 \quad 32 \quad 0$$

**Q179/** Consider the following MATLAB code:

```
z = [ 2 -1 ]; x = z(1); y = z(2);
w1 = x^2 + y^2; w2 = x; output = [ w1 ; w2 ]
what is the value of output? (10 deg.)
```

- A. (5 -1)      B.  $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$       C. (5 2)      D.  $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

Q180/a. Write a single Matlab expression involving  $x$  to produce the output:

1      81      2401      15625      6561      1

b. After executing the following script file in MATLAB

```
>> x = [2:4 ; -1:1 ; 1:3]; y=[x(2,1) , x(2,2) , x(2,3)] ;size(y')
```

the displayed result is:

- a. 2 2      b. 3 1      c. 2 1      d. 1 3      e. none of above

Q181/ a. Write a program to give one of the following:

$4^{20}, 6^{16}, 8^{12}, 10^8, 12^4$       1 81 125 49 9 1

b. what value does the variable q contain after the Matlab code below executes?

```
>> a = [4, 6, 9]; q = (a-2).^2; >> q = 2*q + 2
```

- a. [12 25 57]      b. nothing - operation is not possible  
c. [13 27 79]      d.87      e. [10 34 100]

c. After executing the following script file in MATLAB:

```
x = [2:4 ; -1:1 ; 1:3]; y=x(:,2); size(y')
```

the displayed result is

- a. 2 2      b. 3 1      c. 2 1      d. 1 3      e. none of above

Q182/ a. Consider matrix b generated by the following expression:

```
b=ones (4) +eye (4)      which of the following is true?
```

- 1) b + 4 gives error      2) b(6) = 1      3) The value of b(:,2) is 1  
4) If c = b + j, then the value of c(3,3) is a complex number 2+ 1.0i  
5) None of the above

b. What value does the variable q contain after the Matlab code below executes?

```
%main file      % function m-file
p= 1:2:5;r = myfunc(p)      function r2 = myfunc(p)
                             n = length(p) ;r1 = sum(p) /n;
                             r2 = (sum((p - r1).^2)^2-1)/n;
                             end
```

Q183/ a. What value does the variable r contain after the Matlab code below executes?

```
%main file
p= 1:3:9;r = myfunc(p)
```

```
% function m-file
function r2 = myfunc(p)
n = length(p);r1 = sum(p)/n;
r2 = (sum((p - r1).^2)^2-1)/n;
end
```

b. What are the values of the arrays after execution of each assignment statement for vector s has values 1,-1,3,0,2,0?

1. B = s < 0    2. C=s(s~=B)    3. D = s (2:4)    4. E = s

c. What is the output of executing the following Matlab code?

```
K= 0.5; n=0;
while k ^0.5 < 1.5
k = k + 1;n=n+1;
end
n, k
```

- (A) 0, 0.5    (B) 1, 1.5    (C) 2, 2.5    (D) 3, 3.5

Q184/ a. Draw the Luminescence  $L_\lambda$  using following equations (using function m-file): (5 deg.)

$$L_\lambda = \frac{1}{\lambda^5} \frac{2hc_\lambda^2}{e^{hc_\lambda/\lambda k_B T} - 1} \quad \text{where} \quad c_\lambda = \frac{c}{n_\lambda}$$

where  $h=6.63 \times 10^{-34}$ ,  $n_\lambda = 1.5$ ,  $k_B = 1.23 \times 10^{-23}$ , T has 300-400, and  $\lambda$  has 100-2000 nm.

b. Write function m-file for v(t) and compute it for the t=12 (5 deg.)?

$$v(t) = \begin{cases} 10t^2 - 5t & t < 0 \\ 624 - 5t & t > 10 \\ 36t + 12(t - 16)^2 & t = 5 \\ 2136e^{-0.1(t-26)} & t = 7 \\ 0 & \text{otherwise} \end{cases}$$

Q185/ a. choose correct answer for output from the following code: (3 deg.)

```
d = [1 1 3 4 1]; ind = (d ~= 1); b = d(ind)+1
1. 1 3 4    2. 3 4    3. 4 5    4. 2 3
```

b. what are output of the following code: (3 deg.)

```
r=.1;snew=0;sold=-10;i=0;
while snew>sold
sold=snew;snew=snew+r-i;i=i+1;
end
i,snew
```

c. write a code to find h from following series using loop if z=2: (3 deg.)

$$h = z - 1 + \frac{(z - 1)^2}{2} + \frac{(z - 1)^3}{3} + \frac{(z - 1)^4}{4}$$

Q186/ a. Choose correct answer for the output of following code: (3 deg.)

```
vec = [5 9 3 8 6]; isg = vec > 7; res = isg + 5
```

1. 5 6 6 5 6    2. 5 6 5 6 5    3. 5 9 5 8 6    4. 5 6 4 5 6 5

b. Find output for the following code: (3 deg.)

```
s=0;i=0;
while s<=20
s=s+i;i=i+1;
end
i,s
```

c. Find y from following series using loop: (4 deg.)     $y = 4 \times \frac{4}{3} \times \frac{4}{5} \times \frac{4}{7} \times \frac{4}{9} \times \frac{4}{11}$

Q187/ For the following numbers: write the code and find summation of them using loop: **1, 4, 9, 8, 1, 0**

Q188/ Write a program to define k vector as **2, 2/3, 2/9, 2/27, 2/81** and find production of the numbers using loop.

Q189/ Write a program to define g vector as **1, 5, 16, 27, 16, 1** as a code and summing them using loop.

Q190/ Write a program to define k vector as **4/81, 8/27, 16/9, 32/3** and find production of the numbers using loop.

Q191/ Write a function for the sign of numbers:

$$\text{sgn}(x) = \begin{cases} 1 & x > 0, \\ 0 & x = 0, \\ -1 & x < 0. \end{cases}$$

Q192/ Choose correct answer for output from the following code:

```
d = [1 1 3 4 1]; ind = (d ~= 1); b = d(ind)+1
```

a- 1 3 4    b- 3 4    c- 4 5    d- 2 3

Q193/ what value does the variable s contain after the MATLAB code below executes?

<pre>t=0; for t = 0:0.1:0.5 t=t+0.1; end if t &gt; 0.75 s = 0;</pre>	<pre>elseif t &lt; 0.25 s = 1; else s = 1-2*(t-0.25); end t,s</pre>
--	---

Q194/ What is ginput? Explain their uses?

Q195/ What is the output from the following MATLAB statements:

i. **a=1:3; b=2; a1 = a + b**    ii. **k=1:3:6;a2=k.\*k**  
iii. **a3 = 3\*eye(3,3)+1**    iv. **r=10:15;a4 = 2\*r(3:4)**

Q196/ Choose correct answer for output x from the following code:

```
r=0:0.2:1; z=r<=0.5,y=r>=0.2, x=z.*y+3
```

a- 1 3 3 3 1 3    b- 0 1 1 0 0 0    c- 3 4 4 3 3 3    d- 4 4 3 3 3 3

Q197/ what value does the variable s contain after the MATLAB code below executes?

```
f=1;
for a=2:2:6
    f=f*(2*a-f)
end
f
```

Q198/ What is the output from the following MATLAB statements:

- i. a=2:5; b=2; a1 = a +3\*b    ii. a1=ones(3)+4\*eye(3)
- iii. b1 = [1 2; 3 4];b2 = 2\*ones(2);a3=b1 == b2
- iv. r=10:15;a4 = 2\*r(4:5)

Q199/ Write a function to classify degrees of student to either 'Excellent', 'Very good', 'Good', 'Medium', 'Fair', 'Poor', using Branching with if or switch?

two methods

<pre>function y=switch_ha(x) switch logical(true) case x&lt;50, y='Poor'; case x&gt;=50 &amp;&amp; x&lt;60,y='Fair'; case x&gt;=60 &amp;&amp; x&lt;70,y='Medium'; case x&gt;=70 &amp;&amp; x&lt;80,y='Good'; case x&gt;=80 &amp;&amp; x&lt;90,y='Very Good'; otherwise, y='Excellent'; end</pre>	<pre>function y=if_ha(x) if x&lt;50, y='Poor'; elseif x&gt;=50 &amp;&amp; x&lt;60, y='Fair'; elseif x&gt;=60 &amp;&amp; x&lt;70,y='Medium'; elseif x&gt;=70 &amp;&amp; x&lt;80, y='Good'; elseif x&gt;=80 &amp;&amp; x&lt;90,y='Very Good'; else, y='Excellent'; end</pre>
--	--

Q200/Choose correct answer for output x from the following code:

```
r=0.1:0.4:1; z=r<0.3,y=3*(r>0.3), x=z+y
```

a- 3 3 3    b- 0 1 3    c- 1 3 3    d- 3 0 0

Q201/what value does the variable k and n contain after the MATLAB code below executes?

```
n = 1;k=0;
while n < 10
    k=k+1;n = n*(n+1); n=2*n;
end
k,n
```

Q202/ What is the output from the following MATLAB statements:

- i. a=5:-1:3; b=2; a1 = 3.\*a +b    ii. k=1:3:6;a2=k.\*k
- iii.A = [1 2; 3 4];B = 2\*ones(2);a3=A ~ B
- iv. r=10:15; a4 = 2\*r(3:4)

Q203/Find the sum S of elements  $a_i = \sqrt{2i - 1}$ ,  $i=1, 2, \dots$ , until the sum will exceed 20.

two methods

<pre>s=0;n=1; while s &lt;= 20     s=s+sqrt(2*n-1),n=n+1; end,n-1,s</pre>	<pre>s=0; for n=1:100     if s &lt;= 20,s=s+sqrt(2*n-1),n,end end,s</pre>
---	---

Q204/ Choose correct answer for output x from the following code:

```
r=4:-0.6:2; z=r<=3, x=z.^2+3
```

a- 1 3 3 3      b- 0 1 1 0      c- 3 4 4 3      d- 3 3 4 4

Q205/ what value does the variable i and s contain after the MATLAB code below executes?

```
s=0;i=0;
while s<=20
    s=s+i;i=i+1;
end
```

i,s

Q206/ For the following numbers: write the code and find summation of them using loop: **1, 16, 27, 16, 5, 1**

Q207/ For the following numbers: write the code and find summation of them using loop: **0 1 64 81 16 1**

**Q208/** Find the transmission coefficient from  $T = \frac{16E(V-E)}{V^2} e^{-2ka}$  if  $k = \sqrt{\frac{2m(v-E)}{\hbar^2}}$ , If you now ( $m = 9.11 \times 10^{-31}$ ,  $\hbar = 1.054 \times 10^{-34}$ ,  $a = 6.5 \times 10^{-5}$ ,  $v = 25 \times 10^6$ ,  $e = 5 \times 10^6$ ).

**Q209/** Find the quantum state energy (U), for the given frequency  $\nu$  is 9MHz, from the below instructions:  $h = 6.63 \times 10^{-34}$  j.s,  $c = 3 \times 10^8$  m/s,  $k = 1.38 \times 10^{-23} \frac{j}{k}$ ,  $T = 275$  K

$$U = \frac{8\pi h \nu^3}{c^3} \frac{1}{e^{\frac{h\nu}{kT}} - 1}$$