Tanta University
Faculty of Engineering
Computers and Control Department

Second Year Students
Academic Year 2018/2019
Second Semester

SIGNALS and SYSTEMS ***Code : CCE 2210***

End-of-Semester Exam, June 8 , 2019

Answer the following *four* questions. Time allowed : 3 hours.

Question 1

A continuous-time linear time-invariant system consists of two cascaded subsystems whose respective impulse responses are

$$h_1(t) = \delta(t - 0.5) \qquad \text{and} \qquad h_2(t) = 2\, e^{-t}\, u(t)$$

where $\delta(.)$ is an impulse function and u(.) is a step function.

(a) Using the convolution method , express and sketch the step response p(t) of the system. Calculate p(0), p(0.5), and p(2).

(b) Check the results of part (a) using Laplace transformation.

Question 2

A discrete-time linear time-invariant system has an impulse response

$$h(n) = u(n) - u(n - 5)$$

where u(.) is a step function. Express and sketch the output y(n) of the system when the input is

$$x(n) = u(n - 3) - u(n - 9)$$

Hence, or otherwise, calculate y(2) , y(5), and y(10).

Question 3

(a) Give a definition for the characteristic equation of a feedback system. How does the location of the roots of this equation on the complex plane affect the response of the system ?

(b) The characteristic equation of a system is

$$s^6 + s^5 + 3s^4 + 3s^3 + 3s^2 + 2s + 1 = 0$$

i) Use Routh-Hurwitz criterion to find the complete root distribution, i.e. the number of roots in the left half, in the right half, and on the imaginary axis of the complex plane.

ii) Determine the imaginary-axis roots, if any.

iii) Is the system stable, unstable, or marginally stable ? Why ?

Question 4

A second-order system with input r(t) and output c(t) has the transfer function

$$\frac{C(s)}{R(s)} = \frac{40}{(s+4)^2}$$

Let r(t) = u(t), the step function.

(a) Express and sketch c(t).

(b) Is c(t) of the underdamped , overdamped , or critically damped type ? Why ?

(c) What is the time at which c(t) reaches 90% of its steady–state value ?

BEST WISHES

Prof. Dr. Mahmoud M. Fahmy

حاسبات ٢

قسم هندسة الحاسبات والتحكم الآلي
الدرجة الكلية : 40 درجات
المادة :مجتمع تكنولوجيا المعلومات الفرقة الثانية حاسبات
كود القرر :CCE22H3 الزمن: 2 ساعة التاريخ : يونيو 2019

أجب عن الأسئلة التالية:

Q1: (17 degrees)

1) Interconnection which is present between two or more computers so that they can communicate with each other is called
   a) Network b) sharing c) link d) LAN
2) Arrangement of computer network nodes and connections between them is called
   a) network's topology b) network's layout c) both A and B d) network's link
3) .....is a software package designed to store, manage and provide access to databases.
   a) Operating System b) Database Management System c) Network OS
   d) Binary System e) Security System
4) ..... is the data type which can be used to store video files in a database table.
   a) Number b) Hyper Link c) OLE Object d) AutoNumber
5) .....is a data type used in Microsoft Access tables to generate an automatically incremented numeric counter
   a) Number b) Hyper Link c) OLE Object d) Date/Time e) AutoNumber
6) ..... is an object of Microsoft Access which is used for formatting, calculating, printing and summarizing data.
   a) Table b) Form c) Report d) Relationship e) Primary Key
7) In SQL statements, the names of the tables you want to show their data come after ..... keyword.
   a) Select b) From c) Where d) Order by e) Group by
8) In SQL statements, the symbol which means that you want to select all columns of the mentioned tables is.....
   a) $ b) * c) # d) & e) %
9) A business has both a retail outlet as well as a website that is enabled for ecommerce and has not just a physical or online location defined as:
   a) Electronic Commerce b) Old economy c) Click-and-brick d) E-business
10) An approach aimed at making the human–computer interface more natural
   a) RSS feeds b) Social Computing c) Web 2.0
11) An economy that is based on digital communication networks, computers, software, and other related information technologies:
   a) Social Economy b) Digital economy c) Business economy d) Old economy
12) ..... is made up of one or more fields where duplicate records are not allowed.
   a) Primary Key b) SQL Query c) Microsoft Access
   d) Foreign Key e) Data Type
13) Computer networks require a combination of:
   a) Hardware b) Software c) Microsoft d) A and b both

14) On a LAN network a user can share?
a) Printer b) Modem c) Hard drive d) All of the above

15) Bus topology is suitable for networks:
a) Big b) Equal c) Samll d) Many

16) Which one is the smaller network?
a) LAN b) MAN c) WAN d) PAN

17) Network topology in which you connect each node to network along a single piece of network cable is called
a) bus topology b) ring topology c) star topology d) mesh topology

Q2: True or False (7 degrees)

1. There is a simple solution to securing information
2. Security is a state of freedom from a danger or risk
3. In a relational database table, Records are columns and Fields are rows.
4. Information is raw, unorganized facts on the form of text, numbers, ...etc.
5. if we were to use files to store data instead of DBMS, it is not necessary to provide good methods for access control.
6. Computer network topology which uses center communication point is star
7. The most common type of network is the MAN

السؤال الثالث (16 درجة)

1- تنقسم نظم المعلومات المرتبطة بالحاسب الآلي الي عدة مجموعات رئيسية تكلم عن أربعة من تلك المجموعات .

2- ما هي انواع برامج الحاسب؟ وكيف يمكن التغلب علي مشكلة نسخ البرامج؟

3- اذا كنت مفوضا في مكان عملك، اذكر كيف يمكنك اثبات ذلك؟

4- ما هي الخطوات التي يمكن اتخاذها في وضع سياسة امن البيانات؟

Tanta University

Department of Physics&Mathematics
Total Marks: 85 Marks

Faculty of Engineering

Tanta University Faculty of Engineering	(6/2019) PME2111 Second year (Computer and Automatic Control)

Q (1) (21M)

(a) Find all valus of z such that $(5+z)^6 = (1+i)z^6$

(b) IF the velocity potential of Fluid flow is $u(x,y) = x^3y - y^3x$ find
(i)Complex potential function F(z)
(ii) Speed of Fluid flow at (x,y)

(c) Find all valus of z such that $\cosh z = (1+i)^{1+i}$

Q (2) (21M)

(a) Evaluate $\oint_{|z|=6} \frac{\sinh z}{(z+i)(z-4)}\,dz$ and $\oint_{|z-i|=5} \frac{e^{2z}}{(z-4)^4}\,dz$

(b) Find Laurent's expansion of $f(z) = \frac{z^2\,sinz}{z^2-5z+6}$ on the following regions
(i) $|z-2| > 1$
(ii) $2 < |z| < 3$

(c) Using Bromwich contour to find inverse Laplace transform of

$$F(s) = \frac{\tanh(\frac{as}{2})}{s(s+b)}$$

Q (3) (21M)

(a) Evaluate the following by use Gamma and Beta functions
(i) $\int_0^{\frac{1}{2}} x^{m-1} \left(\ln\left(\frac{1}{2x}\right)\right) dx$
(ii) $\int_{-\infty}^{\infty} 5^{(3x^2-5^{x^2})}\,dx$
(ii) $\int_2^6 (x-2)^4 \sqrt{6-x}\,dx$

(b) Use generating function of Bessel function to find the following integration

$$\int_0^{\pi} \cos(x\sin\theta - \frac{5\theta}{2})d\theta$$

(c) Find Fourier Bessel expansion of the function $f(x) = x^2$, $0 \le x \le 1$ in the form $\sum_0^{\infty} a_n J_0(\mu_k x)$, $J_0(\mu_k) = 0$

Q (4) (22M)

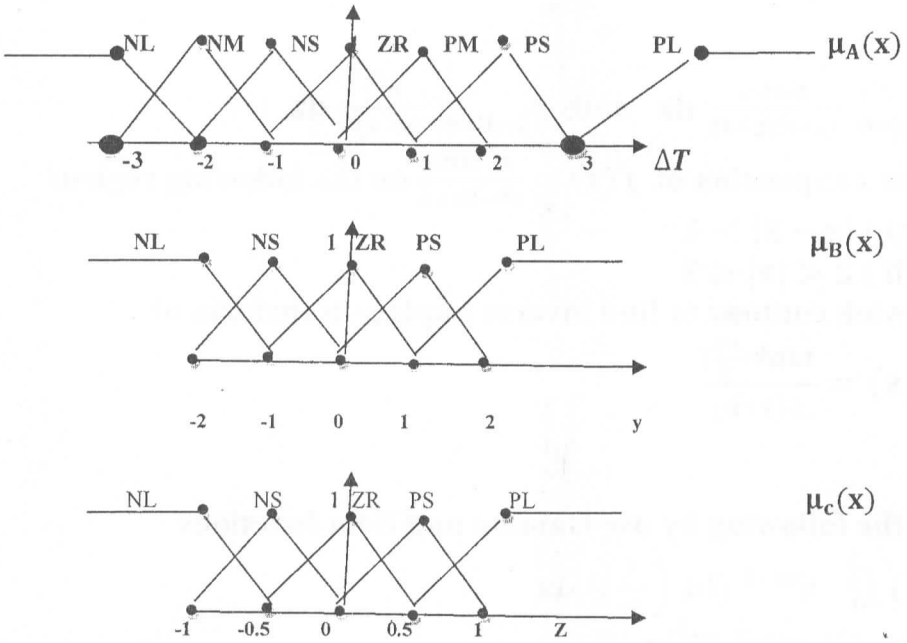
(a) Consider the fuzzy sets $\tilde{A}$, $\tilde{B}$ and $\tilde{C}$ defined by the memberships

$\mu_A(x) = e^{-2x}$, $\mu_B(x) = \frac{1}{1+2e^x}$ and $\mu_C(x) = \frac{1}{1+(x-10)^2}$

(i) Determine the mathematical formulas and graphs of memberships functions of $\mu_{A\cup B}$ and $\mu_{A\cap B}$ in interval $[0, 10]$

(ii) Find $\sup(\widetilde{C})$,center, height crossover points of $\widetilde{C}$ and α-cut sets of the above set for α =0.5, and 0.9

(c) An air conditioner estimates the difference between the surrounded temperature T and the wanted values T_0
(i. e the reached temperature and $\Delta T = T - T_0$) .Mention the operation system Z that calculated at $\Delta T = 2.2$ and $\frac{d\Delta T}{dt} = 0.3$ where ΔT and $y = \frac{d\Delta T}{dt}$ represented by fuzzy variables with memberships $\mu_A(x)$ and $\mu_B(x)$ as follows



Where the fuzzy values NL≡ negative Large , NM≡negative medium, NS≡ negative small, $ZR \equiv Zero$, PL≡ positive large , PM≡ positive mediumand PS≡ positive small . The variable Z is fuzzy variable represented the type of operating system(on/off sytem)as follows

(i) The air conditions pushes cold air if Z is NL
(ii) The air conditions pushes cold air if Z is NS in discrete way (operates not continual)
(iii) The air conditions pushes hot air if Z is PL
(iv) The air conditions pushes hot air if Z is PS in discrete way (operates not continual)

(c)Find a power series solution in powers of x by Forbenius method of

$$4x\,y'' + 2\,y' + y = 0$$

With Best Wishes

Course Examinatione and Coordinators
Dr. Mohamed Shokry

Tanta University | Department: Computer and Control | Faculty of Engineering

Total Marks: (100) Marks

Course Title: Communication Systems	Course Code: EEC 2247	Year: 2018/2019
Date: 1 /6/2019	Allowed time: (3) Hrs.	No. of Pages: (2)

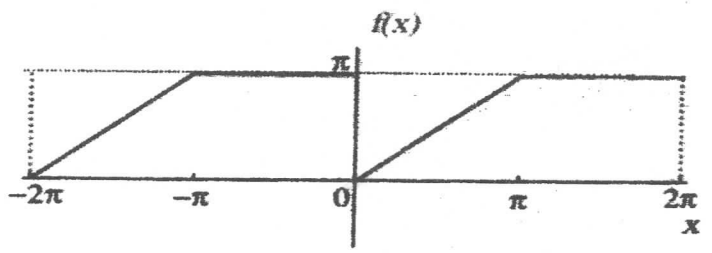
Question No. 1:

Complete the following sentences: **[15 Marks]**

1. Parseval's power theorem states that.....
2. The frequency shifting property states that.....
3. Integration of a function $g(t)$ has the effect of dividing its Fourier transform $G(f)$ by a factor..... .....assuming that $G(0)$ is zero.
4. For a rectangular pulse with amplitude A and duration T, the equivalent rectangular bandwidth (W_e) equals.....
5. The transmission bandwidth B_T for an AM wave is....., where W is the message bandwidth.
6. When 100% modulation is used in .....wave, the total power in the two side-frequencies of the resulting wave is only one third of the total power.
7. The narrow-band FM wave is effectively composed of a ..... and a single pair of side-frequencies.
8. The convolution of any function with the .....function leaves that function unchanged.
9. The ..... function is defined as the integral of the Dirac delta function.
10. Carson's rule defines an approximate rule for the ..... of FM wave generated by a single-tone modulating wave.
11. In phase modulation, the frequency of the carrier wave is varied.....with the baseband signal.
12. Fourier Transform for a ..... pulse is $1/(1+j2\pi f)$.
13. The time shifting property states that if a function $g(t)$ is shifted in positive direction by an amount t_0, the effect is equivalent to multiplying its Fourier transform by the factor.....
14. Inverse Fourier transform of the function: $0.5[\text{sinc}(f-f_c) + \text{sinc}(f+f_c)]$ is.....
15. The simplest circuit for the demodulation of AM wave is.....

Question No.2: **[43 Mark]**

A. Find the Fourier series for the periodic extension of the following signal: **[7 Marks]**



B. Determine the Fourier transform for the following functions: **[8 Marks]**

a. $g(t) = rect\left(\frac{t-3}{4}\right) + 8\sin(6\pi t)$

b. $e^{-t}.u(t)$

C. The total power content of AM signal is 1000W. determine the power being transmitted at the:

a. Carrier frequency.

b. Each of the side bands when the percent modulation is 80%. **[6 Marks]**

D. An audio signal m(t) = 20 cos (2π1800t) amplitude modulates a carrier: 80 cos (2π100000t)

a. Write down the AM equation.

b. Sketch the AM wave.

c. Determine the modulation factor.

d. Sketch the spectrum of AM wave. **[11 Marks]**

E. An audio signal with amplitude A_m = 4V and frequency f_m = 1200 HZ is used to modulate the frequency of a carrier signal with amplitude A_c = 8 V and frequency f_c = 4 MHZ. With the modulation sensitivity k_f = 5652 rad/sec/volt.

a. Write the equation of the modulated signal.

b. Calculate the maximum frequency deviation.

c. Calculate the modulated signal bandwidth.

d. Show how to make the frequency modulation could equal 30 KHZ. **[11 Marks]**

Question No.3: **[42 Marks: 6 marks for each item]**

A. Prove that the narrow-band FM wave is somewhat similar to the corresponding one defining an AM wave.

B. Explain with drawing how to use voltage controlled oscillator (VCO) for the generation of *both* a phase modulated (PM) wave and a wide band frequency modulated wave.

C. Explain how the square-law modulator can be used for the generation of AM waves.

D. Draw the circuit diagram of a ring modulator and explain how it is used for the generation of DSBSC waves.

E. The DSBSC receiver complexity is the price that must be paid for suppressing the carrier wave to save the transmitter power. Discuss with drawing the Costas receiver.

F. Drive an expression for the Fourier series representation of a wide-band single-tone FM as a function of the n^{th} order Bessel function of the first kind.

G. Compare between the frequency discriminator and phase discriminator circuits used for the generation of SSBSC wave then indicate which one is better.

****

End of Questions

Best wishes of success

Dr. Roayat Ismail (Coordinator of the Course)

Course Title: Computer Graphics | Course Code: CCE3271 | Year: 2nd
Date: 3-6-2019 (Final) | Allowed time: 3 Hours | No. of Pages: (5)

Model B

Complete the following PyOpenGL code that makes an animation. This animation simulates the "hammering a nail" process. Every time hammer touches the nail, the nail goes a certain distance down. Nail color is black.

```
from math import *
from OpenGL.GL import *
from OpenGL.GLUT import *
from OpenGL.GLU import *

rangle = 0.0
CW = 0
Top = 0.2

x0 = ...(1)...
y0 = ...(2)...

# Directional light source in the direction of -z
LightPos   = ...(3)...
LightAmb   = [ 1, 1 , 1 , 1.0 ]
LightDiff  = [ 1, 1 , 1 , 1.0 ]

# Relection of front-face Material
MatAmbF    = [ 0.3 , 0.3 , 0.3 ,1 ]
MatDiffF   = [ 1 , 1 , 1 ,1 ]

def InitGL(Width, Height):
   glClearColor(1.0, 1.0, 1.0, 0.0)
   glEnable(GL_DEPTH_TEST)
   glLineWidth(10)
   glPointSize(10)

   glLightfv(GL_LIGHT1, GL_POSITION, LightPos)
   glLightfv(GL_LIGHT1, ...(4)... , LightAmb)
   glLightfv(GL_LIGHT1, GL_DIFFUSE,  LightDiff)

   glEnable( ...(5)... )
   glEnable( ...(6)... )

   glMaterialfv(GL_FRONT, GL_AMBIENT, MatAmbF)
   glMaterialfv(GL_FRONT, GL_DIFFUSE , MatDiffF)

   glMatrixMode(GL_PROJECTION)
   glLoadIdentity( )
   glOrtho(-1,1,-1,1,-1,1)

   glMatrixMode( ...(7)... )

def DrawGLScene( ):
  global rangle, CW, Top
  global LightAmb,LightDiff
```

```
  glTranslate(0, 0.5, 0)
  glScale(0.8,0.5,1)
  glutSolidCube(0.5)

  LightAmb   = ...(10)...
  LightDiff  = ...(10)...
  glLightfv(GL_LIGHT1, ...(4)... , LightAmb)
  glLightfv(GL_LIGHT1, GL_DIFFUSE,  LightDiff)

  ...(11)...
  glBegin( ...(9)... )  # Nail
  glVertex(-0.51, ...(12)... , 0)
  glVertex(-0.51, ...(12)... - 0.2 , 0)
  glEnd( )

  if ...(13)... :
    CW = 0  # and Hammer color is red

  if ...(14)... :
    CW = 1  # and Hammer color is blue

  if CW == 0:
    rangle = ...( 15)...
    LightAmb   = ...(16)...
    LightDiff  = ...(16)...
  else:
    rangle = ...(17)...
    LightAmb   = ...(18)...
    LightDiff  = ...(18)...

  glLightfv(GL_LIGHT1, ...(4)... , LightAmb)
  glLightfv(GL_LIGHT1, GL_DIFFUSE,  LightDiff)

# (x,y) are midpoint coordinates of the left side of the hammer
  x    =    x0*...(19)...(radians(rangle))    -
y0*...(20)...(radians(rangle))
  y    =    x0*...(20)...(radians(rangle))    +
y0*...(19)...(radians(rangle))

  if ...(21)... :
    Top = ...(22)...
    CW = ...(23)...

  ...(24)...

def main( ):
```

Model B (1)

1- (1) is :
   a) 0.1 b) 0 c) -0.1 d) -0.2
2- (2) is :
   a) -0.15 b) 0.25 c) 0.5 d) -0.2
3- (3) is :
   a) [0, 0 , 2] b) [0, 0 , -2] c) [0, 0 , 2 , 1] d) [0, 0 , 2 , 0]
4- (4) is :
   a) GL_AMBIENT b) GL_DIFFUSE c) AMBIENT d) DIFFUSE
5- (5) is :
   a) GL_LIGHT b) GL_LIGHT0 c) GL_LIGHT1 d) GL_LIGHTING
6- (6) is :
   a) GL_LIGHT b) GL_LIGHT0 c) GL_LIGHT1 d) GL_LIGHTING
7- (7) is :
   a) GL_CAMERA b) GL_MODELVIEW c) GL_PROJECTION
8- (8) is :
   a) glRotate(rangle+60, 0, 1, 0) b) glTranslate(-0.2, 0.1, 0) c) glLoadIdentity( )
9- (9) is :
   a) GL_POINTS b) GL_POLYGON c) GL_QUADS d) GL_LINES
10- (10) is :
   a) [0, 0 , 0 , 1.0] b) [1, 0 , 0 , 1.0] c) [0, 1 , 0 , 1.0] d) [0, 0 , 1 , 1.0]
11- (11) is :
   a) glRotate(rangle+60, 0, 1, 0) b) glTranslate(-0.2, 0.1, 0) c) glLoadIdentity( )
12- (12) is :
   a) Top b) x0 c) y0 d) rangle
13- (13) is :
   a) x0 <= 0 b) rangle >= 90 c) rangle <= 0 d) x0 >= 0
14- (14) is :
   a) x0 <= 0 b) rangle >= 90 c) rangle <= 0 d) x0 >= 0
15- (15) is :
   a) y0 - 0.05 b) y0 + 0.05 c) rangle - 0.05 d) rangle + 0.05
16- (16) is :
   a) [0, 0 , 0 , 1.0] b) [1, 0 , 0 , 1.0] c) [0, 1 , 0 , 1.0] d) [0, 0 , 1 , 1.0]
17- (17) is :
   a) y0 - 0.05 b) y0 + 0.05 c) rangle - 0.05 d) rangle + 0.05
18- (18) is :
   a) [0, 0 , 0 , 1.0] b) [1, 0 , 0 , 1.0] c) [0, 1 , 0 , 1.0] d) [0, 0 , 1 , 1.0]
19- (19) is :
   a) cos b) cosh c) sin d) sinh
20- (20) is :
   a) cos b) cosh c) sin d) sinh
21- (21) is :
   a) y > Top b) y < Top c) y < y0 d) y > y0

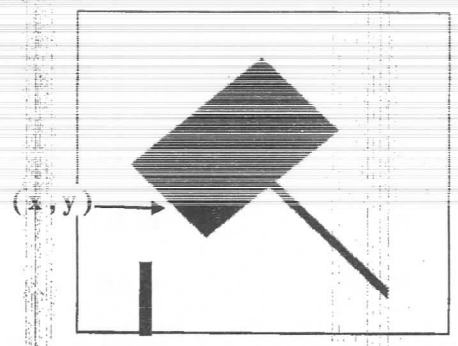
Model B (2)

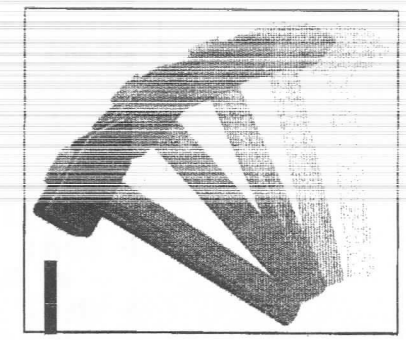
A موديل ٢٩

22- (22) is :
a) y0 + 0.01 b) y0 - 0.1 c) Top - 0.01 d) Top + 0.01

23- (23) is :
a) 1 b) 0 c) 2*CW d) CW*CW

24- (24) is :
a) DrawGLScene b) glFlush( ) c) glutSwapBuffers( )





- Given a point whose world coordinates are (-20, 10, -15).
- Given the parameters of the perspective projection frustum are as follows: fovy = 140° , aspect ratio = 1 , zNear =1 , zFar = 100
- The camera is at (0,0,0). It looks at (0,0,-1). The Up vector is at (0,1,0).

25- The camera coordinates of this point =
a) (-20, 10, -15) b) (-2, 8, 6) c) (100, -2, 18) d) none of the above

26- First row in M_projection =
a) (8.78, 0, 0, 0) b) (0.14, 0, 0, 0) c) (0.36, 0, 0, 0)

27- Second row in M_projection =
a) (0, 8.78, 0, 0) b) (0, 0.14, 0, 0) c) (0, 0.36, 0, 0)

28- Third row in M_projection =
a) (0, -1, -2, 0) b) (0, 0, -1, -2) c) (-2, -1, 0 , 0)

29- Screen Coordinates =
a) (0.36, -0.16, -1) b) (-1, 0.56, -0.14) c) (-0.49, 0.24, 0.89)

30- Rotation is always ...
a) Linear b) commutative c) non-commutative

Complete the following PyOpenGL code that makes an animation. This animation simulates a moving wheel to right and to left using the keys. "*" means a hidden item.**

```
from OpenGL.GL import *
from OpenGL.GLUT import *
from OpenGL.GLU import *
import pygame

rangle = 0.0
Pos = 0

def keyFunc(key,x,y):
  global Pos, rangle
  if key == b"a" and Pos ...(1)... : # collision detection
    Pos = Pos ...(2)...   # wheel moves to left
    rangle = rangle ...(3)...

  if key == b"s" and Pos ...(4)... : # collision detection
    Pos = Pos ...(5)...   # wheel moves to right
    rangle = rangle ...(6)...

def InitGL(Width, Height):
  glClearColor(1.0, 1.0, 1.0, 0.0)
  glLineWidth(5)
  glMatrixMode(GL_PROJECTION)
  glLoadIdentity( )
  glOrtho(-1,1,-1,1,-1,1)

  glMatrixMode(***)

  texture = ...(7)...  (1)
  imgload = pygame.image.load("wheel.jfif")
  img = pygame.image.  ...(8)... (imgload, "RGBA", 1)
  width = imgload.get_width( )
  height = imgload.get_height( )

  ...(9)... (GL_TEXTURE_2D, texture)
  glTexParameter(GL_TEXTURE_2D,
GL_TEXTURE_MAG_FILTER, ...(10)... ) # blurry texture
  glTexParameter(GL_TEXTURE_2D,
GL_TEXTURE_MIN_FILTER, ***)

  glTexImage2D(GL_TEXTURE_2D, 0, 4, width, height, 0,
GL_RGBA,GL_UNSIGNED_BYTE, ...(11)... )

  ...(12)... (GL_TEXTURE_2D)

  glTexCoord( ...(14)... )
  glVertex(-0.1, -0.1, 0)

  glTexCoord( ...(15)... )
  glVertex(0.1, -0.1, 0)

  glTexCoord( ...(16)... )
  glVertex(0.1, 0.1, 0)

  glTexCoord( ...(17)... )
  glVertex(-0.1, 0.1, 0)
  glEnd( )

  glColor(0,0,0)
  glLoadIdentity( )

  glBegin(GL_LINES)
  glVertex(-1,-0.1,0)
  glVertex(1,-0.1,0)
  glEnd( )

  glutSwapBuffers( )

def main( ):
  ...(18)... ( )
  glutInitDisplayMode(GLUT_RGBA |
GLUT_DOUBLE )
  glutInitWindowSize(800, 800)
  glutInitWindowPosition(0, 0)
  glutCreateWindow(b"Moving wheel")
  glutKeyboardFunc( ...(19)... )
  glutDisplayFunc(DrawGLScene)
  ...(20)... (DrawGLScene)
  InitGL(800, 800)
  glutMainLoop( )
main( )
```

Model B (3)

31- (1) is :
a) <= (1+0.1) b) <= (1 - 0.1) c) >= (-1+0.1) d) >= (-1 - 0.1)

32- (2) is :
a) + 0.01 b) – 0.01

33- (3) is :
a) + 3 b) - 3

34- (4) is :
a) <= (1+0.1) b) <= (1 - 0.1) c) >= (-1+0.1) d) >= (-1 - 0.1)

35- (5) is :
a) + 0.01 b) - 0.01

36- (6) is :
a) + 3 b) - 3

37- (7) is :
a) glgenTextures b) glGentextures c) glGenTextures d) none of the above

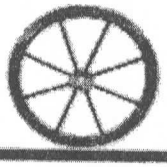
38- (8) is :
a) 2Texture b) toTexture c) tostring d) none of the above

39- (9) is :
a) glbindtexture b) glTextureBind c) gltexturebind d) none of the above

40- (10) is :
a) GL_NEARST b) GL_LINEAR c) GL_BILINEAR d) MIPMAP

Model B (4)

41- (11) is :
a) texture b) imgload c) img d) none of the above
42- (12) is :
a) glEnable b) glClear c) glClearColor d) none of the above
43- (13) is :
a) Position b) Pos c) x d) none of the above
44- (14) is :
a) 1,1 b) 1,0 c) 0,1 d) 0,0
45- (15) is :
a) 1,1 b) 1,0 c) 0,1 d) 0,0
46- (16) is :
a) 1,1 b) 1,0 c) 0,1 d) 0,0
47- (17) is :
a) 1,1 b) 1,0 c) 0,1 d) 0,0
48- (18) is :
a) glutidlefunc b) glutIdleFunc c) glutInit d) glutinit
49- (19) is :
a) keyFun b) keyboardFun c) keyboardFunc d) keyFunc
50- (20) is :
a) glutidlefunc b) glutIdleFunc c) glutInit d) glutinit



Tanta University

Department: Elec. Computers & Control Engineering
Total Marks: 75 Marks

Faculty of Engineering

Course Title: Computer Graphics
Date: 3-6-2019 (Final)

Course Code: CCE3271
Allowed time: 3 Hours

Year: 2nd
No. of Pages: (5)

Model A

- Given a point whose world coordinates are (-20, 10, -15).
- Given the parameters of the perspective projection frustum are as follows: fovy = 140° , aspect ratio = 1 , zNear =1 , zFar = 100
- The camera is at (0,0,0). It looks at (0,0,-1). The Up vector is at (0,1,0).

1- The camera coordinates of this point =
   a) (-20, 10, -15) b) (-2, 8, 6) c) (100, -2, 18) d) none of the above
2- First row in M_projection =
   a) (8.78, 0, 0, 0) b) (0.14, 0, 0, 0) c) (0.36, 0, 0, 0)
3- Second row in M_projection =
   a) (0, 8.78, 0, 0) b) (0, 0.14, 0, 0) c) (0, 0.36, 0, 0)
4- Third row in M_projection =
   a) (0, -1, -2, 0) b) (0, 0, -1, -2) c) (-2, -1, 0 , 0)
5- Screen Coordinates =
   a) (0.36, -0.16, -1) b) (-1, 0.56, -0.14) c) (-0.49, 0.24, 0.89)
6- Rotation is always …
   a) Linear b) commutative c) non-commutative

Complete the following PyOpenGL code that makes an animation. This animation simulates the "hammering a nail" process. Every time hammer touches the nail, the nail goes a certain distance down. Nail color is black.

```
from math import *
from OpenGL.GL import *
from OpenGL.GLUT import *
from OpenGL.GLU import *

rangle = 0.0
CW = 0
Top = 0.2

x0 = …(1)…
y0 = …(2)…

# Directional light source in the direction of -z
LightPos  = …(3)…
LightAmb  = [ 1, 1 , 1 , 1.0 ]
LightDiff = [ 1, 1 , 1 , 1.0 ]

# Relection of front-face Material
MatAmbF   = [ 0.3 , 0.3 , 0.3 ,1 ]
MatDiffF  = [ 1 , 1 , 1 ,1 ]

def InitGL(Width, Height):
  glClearColor(1.0, 1.0, 1.0, 0.0)
  glEnable(GL_DEPTH_TEST)
  glTranslate(0, 0.5, 0)
  glScale(0.8,0.5,1)
  glutSolidCube(0.5)

  LightAmb  = …(10)…
  LightDiff = …(10)…
  glLightfv(GL_LIGHT1, …(4)… , LightAmb)
  glLightfv(GL_LIGHT1, GL_DIFFUSE, LightDiff)

  …(11)…
  glBegin( …(9)… )  # Nail
  glVertex(-0.51, …(12)… , 0)
  glVertex(-0.51, …(12)… - 0.2 , 0)
  glEnd( )

  if …(13)… :
    CW = 0  # and Hammer color is red

  if …(14)… :
    CW = 1  # and Hammer color is blue

  if CW == 0:
    rangle = …( 15)…
    LightAmb  = …(16)…
    LightDiff  = …(16)…
  else:
    rangle = …(17)…
    LightAmb  = …(18)…
    LightDiff  = …(18)…

  glLightfv(GL_LIGHT1, …(4)… , LightAmb)
  glLightfv(GL_LIGHT1, GL_DIFFUSE, LightDiff)

# (x,y) are midpoint coordinates of the left side of the hammer
  x  =  x0*…(19)…(radians(rangle))  -
y0*…(20)…(radians(rangle))
  y  =  x0*…(20)…(radians(rangle))  +
y0*…(19)…(radians(rangle))

  if …(21)… :
    Top = …(22)…
    CW = …(23)…

  …(24)…

def main( ):
  glutInit( )
  glutInitDisplayMode(GLUT_RGBA |
GLUT_DOUBLE | GLUT_DEPTH )
  glutInitWindowSize(800, 800)
  glutInitWindowPosition(0, 0)
  glutCreateWindow(b"Hammering a nail")
  glutDisplayFunc(DrawGLScene)
  glutIdleFunc(DrawGLScene)
  InitGL(800, 800)
  glutMainLoop( )

main( )
```

```
  glLineWidth(10)
  glPointSize(10)

  glLightfv(GL_LIGHT1, GL_POSITION, LightPos)
  glLightfv(GL_LIGHT1, …(4)… , LightAmb)
  glLightfv(GL_LIGHT1, GL_DIFFUSE, LightDiff)

  glEnable( …(5)… )
  glEnable( …(6)… )

  glMaterialfv(GL_FRONT, GL_AMBIENT, MatAmbF)
  glMaterialfv(GL_FRONT, GL_DIFFUSE , MatDifF)

  glMatrixMode(GL_PROJECTION)
  glLoadIdentity( )
  glOrtho(-1,1,-1,1,-1,1)

  glMatrixMode( …(7)… )

def DrawGLScene( ):
  global rangle, CW, Top
  global LightAmb,LightDiff

  glClear(GL_COLOR_BUFFER_BIT |
GL_DEPTH_BUFFER_BIT )

  …(8)…
  glRotate(rangle , 0, 0, 1 )

  glBegin( …(9)… )
  glVertex(0,0,0)
  glVertex(0,0.5,0)
  glEnd( )
```

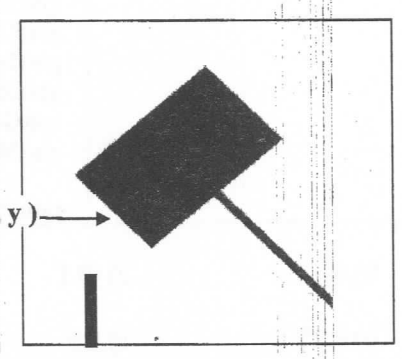
7- (1) is :
   a) 0.1 b) 0 c) -0.1 d) -0.2
8- (2) is :
   a) -0.15 b) 0.25 c) 0.5 d) -0.2
9- (3) is :
   a) [0, 0 , 2] b) [0, 0 , -2] c) [0, 0 , 2 , 1] d) [0, 0 , 2 , 0]
10- (4) is :
   a) GL_AMBIENT b) GL_DIFFUSE c) AMBIENT d) DIFFUSE
11- (5) is :
   a) GL_LIGHT b) GL_LIGHT0 c) GL_LIGHT1 d) GL_LIGHTING
12- (6) is :
   a) GL_LIGHT b) GL_LIGHT0 c) GL_LIGHT1 d) GL_LIGHTING
13- (7) is :
   a) GL_CAMERA b) GL_MODELVIEW c) GL_PROJECTION
14- (8) is :
   a) glRotate(rangle+60, 0, 1, 0) b) glTranslate(-0.2, 0.1, 0) c) glLoadIdentity( )
15- (9) is :
   a) GL_POINTS b) GL_POLYGON c) GL_QUADS d) GL_LINES
16- (10) is :
   a) [0, 0 , 0 , 1.0] b) [1, 0 , 0 , 1.0] c) [0, 1 , 0 , 1.0] d) [0, 0 , 1 , 1.0]
17- (11) is :
   a) glRotate(rangle+60, 0, 1, 0) b) glTranslate(-0.2, 0.1, 0) c) glLoadIdentity( )

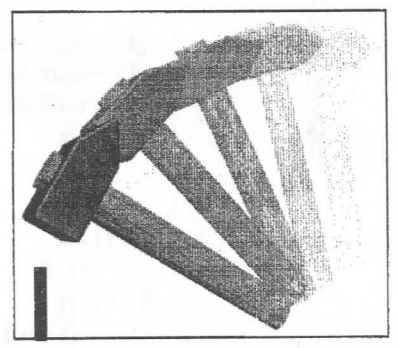
```
    Pos = Pos ...(5)...  # wheel moves to right
    rangle = rangle ...(6)...

def InitGL(Width, Height):
  glClearColor(1.0, 1.0, 1.0, 0.0)
  glLineWidth(5)
  glMatrixMode(GL_PROJECTION)
  glLoadIdentity( )
  glOrtho(-1.1,-1.1,-1.1,1.1)

  glMatrixMode(***)

  texture = ...(7)...  (1)
  imgload = pygame.image.load("wheel.jfif")
  img = pygame.image.  ...(8)... (imgload, "RGBA", 1)
  width = imgload.get_width( )
  height = imgload.get_height( )

  ...(9)... (GL_TEXTURE_2D, texture)
  glTexParameter(GL_TEXTURE_2D,
GL_TEXTURE_MAG_FILTER, ...(10)... ) # blurry texture
  glTexParameter(GL_TEXTURE_2D,
GL_TEXTURE_MIN_FILTER, ***)

  glTexImage2D(GL_TEXTURE_2D, 0, 4, width, height, 0,
GL_RGBA,GL_UNSIGNED_BYTE, ...(11)... )

  ...(12)... (GL_TEXTURE_2D)
```

```
  glVertex(0.1, -0.1, 0)

  glTexCoord( ...(16)... )
  glVertex(0.1, 0.1, 0)

  glTexCoord( ...(17)... )
  glVertex(-0.1, 0.1, 0)
  glEnd( )

  glColor(0,0,0)
  glLoadIdentity( )

  glBegin(GL_LINES)
  glVertex(-1,-0.1,0)
  glVertex(1,-0.1,0)
  glEnd( )

  glutSwapBuffers( )

def main( ):
  ...(18)... ( )
  glutInitDisplayMode(GLUT_RGBA |
GLUT_DOUBLE )
  glutInitWindowSize(800, 800)
  glutInitWindowPosition(0, 0)
  glutCreateWindow(b"Moving wheel")
  glutKeyboardFunc( ...(19)... )
  glutDisplayFunc(DrawGLScene)
  ...(20)... (DrawGLScene)
  InitGL(800, 800)
  glutMainLoop( )
main( )
```

31- (1) is :
a) <= (1+0.1) b) <= (1 - 0.1) c) >= (-1+0.1) d) >= (-1 - 0.1)
32- (2) is :
a) + 0.01 b) – 0.01
33- (3) is :
a) + 3 b) - 3
34- (4) is :
a) <= (1+0.1) b) <= (1 - 0.1) c) >= (-1+0.1) d) >= (-1 - 0.1)
35- (5) is :
a) + 0.01 b) - 0.01
36- (6) is :
a) + 3 b) - 3
37- (7) is :
a) glgenTextures b) glGentextures c) glGenTextures d) none of the above
38- (8) is :
a) 2Texture b) toTexture c) tostring d) none of the above
39- (9) is :
a) glbindtexture b) glTextureBind c) gltexturebind d) none of the above
40- (10) is :
a) GL_NEARST b) GL_LINEAR c) GL_BILINEAR d) MIPMAP
41- (11) is :
a) texture b) imgload c) img d) none of the above
42- (12) is :
a) glEnable b) glClear c) glClearColor d) none of the above

18- (12) is :
a) Top b) x0 c) y0 d) rangle
19- (13) is :
a) x0 <= 0 b) rangle >= 90 c) rangle <= 0 d) x0 >= 0
20- (14) is :
a) x0 <= 0 b) rangle >= 90 c) rangle <= 0 d) x0 >= 0
21- (15) is :
a) y0 - 0.05 b) y0 + 0.05 c) rangle - 0.05 d) rangle + 0.05
22- (16) is :
a) [0, 0 , 0 , 1.0] b) [1, 0 , 0 , 1.0] c) [0, 1 , 0 , 1.0] d) [0, 0 , 1 , 1.0]
23- (17) is :
a) y0 - 0.05 b) y0 + 0.05 c) rangle - 0.05 d) rangle + 0.05
24- (18) is :
a) [0, 0 , 0 , 1.0] b) [1, 0 , 0 , 1.0] c) [0, 1 , 0 , 1.0] d) [0, 0 , 1 , 1.0]
25- (19) is :
a) cos b) cosh c) sin d) sinh
26- (20) is :
a) cos b) cosh c) sin d) sinh
27- (21) is :
a) y > Top b) y < Top c) y < y0 d) y > y0
28- (22) is :
a) y0 + 0.01 b) y0 - 0.1 c) Top - 0.01 d) Top + 0.01
29- (23) is :
a) 1 b) 0 c) 2*CW d) CW*CW
30- (24) is :
a) DrawGLScene b) glFlush( ) c) glutSwapBuffers( )





Complete the following PyOpenGL code that makes an animation. This animation simulates a moving wheel to right and to left using the keys. "***" means a hidden item.

```
from OpenGL.GL import *
from OpenGL.GLUT import *
from OpenGL.GLU import *
import pygame

rangle = 0.0
Pos = 0

def keyFunc(key,x,y):
  global Pos, rangle
  if key == b"a" and Pos ...(1)... : # collision detection
    Pos = Pos ...(2)...  # wheel moves to left
    rangle = rangle ...(3)...

  if key == b"s" and Pos ...(4)... : # collision detection
```

```
def DrawGLScene( ):
  global Pos,rangle
  glClear(GL_COLOR_BUFFER_BIT )

  glLoadIdentity( )
  glTranslate( ...(13)... , 0, 0)
  glRotate(rangle , 0, 0, 1 )

  glColor(1,1,1)

  glBegin(GL_QUADS)
  glTexCoord( ...(14)... )
  glVertex(-0.1, -0.1, 0)

  glTexCoord( ...(15)... )
```

43- (13) is :

a) Position b) Pos c) x d) none of the above

44- (14) is :

a) 1,1 b) 1,0 c) 0,1 d) 0,0

45- (15) is :

a) 1,1 b) 1,0 c) 0,1 d) 0,0

46- (16) is :

a) 1,1 b) 1,0 c) 0,1 d) 0,0

47- (17) is :

a) 1,1 b) 1,0 c) 0,1 d) 0,0

48- (18) is :

a) glutidlefunc b) glutIdleFunc c) glutInit d) glutinit

49- (19) is :

a) keyFun b) keyboardFun c) keyboardFunc d) keyFunc

50- (20) is :

a) glutidlefunc b) glutIdleFunc c) glutInit d) glutinit