KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 2nd Term Examination, 2020
Department of Computer Science and Engineering
CSE 1201
Structured Programming

TIME: 1.5 hours FULL MARKS: 120

N.B. i) Answer **ANY TWO** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY TWO** questions from this section in Script A)

1. a) What is structured programming language? Explain with example. Why does C called a structured programming language? (10)
   b) Write down some characteristics and uses of C programming language with example. (10)
   c) If you are going to learn a natural language like "Bangla", firstly, you must learn the alphabets, words and sentences, then you can do a conversation through that language. Now your task is to converse with a computer. What will be your steps to learn a computer language? Explain with example. (10)

2. a) How can a programmer make the documentation of a C program? Discuss with proper examples. (08)
   b) Suppose, X and Y are two signed data types (integer) of size 5 bits and 7 bits in C program. Then, consider the following code segment. (11)

```
#include<studio.h>
int main()
{
   X x = 37;
   Y y = 128;
}
```

What are the values will be stored in variable x and y?

c) Consider the following C code and analyze the output of it. (11)

```
#include<studio.h>
int main()
{
   int a =,1, b = 0, c = -1, x, y;
   x = b && a++;
   y = ++c | ++a;
   Printf("x = %d, y = %d, a = %d, c = %d", x, y, a, c);

}
```

3. a) Design a user defined function which returns the summation, subtraction, and multiplication of two integer values taking as parameters (having only two parameters of that function but return three values). (11)
   b) What are the differences between switch case block and else if ladder block? (09)
   c) Write a C program which takes an integer number as an input from keyboards and output the summation of its even digits. (10)
   Sample input: `12345`
   Sample output: `6`

SECTION B

(Answer **ANY TWO** questions from this section in Script B)

4. a) How can we initialize a two dimensional array of size 4 by 3? Give example(s). (03)
   b) Write down macro definitions for the following: (06)
      i) To find arithmetic mean of two numbers.
      ii) To convert an uppercase alphabet to lowercase.
   c) Write a program that deletes the last character of all words in a given string. (10)
   d) Explain "stringizing" and "token-pasting" operator using proper examples. (11)

5. a) Write down the value of j and k for each statement. (04)

```
Double i = 10, *J, *K; // sizeof(double) = 8
       J = &i; // Address of i = 16 (assume)
       J = J + 3; // J =?
       J = J + 1; // J =?
       K = J - 1; // K =?
       K = J + 2; // K =?
```

b) Write a program using pointer to read one dimension array of integers and print its elements in reverse order using pointer. (08)

c) Suppose, you have a 5 by 5 matrix, example: `input[5][5]`. How can you access "`input[2][3]`" element of the matrix "`input`" using pointer? (04)

d) Differentiate between malloc() and calloc() with their declarations. How can we change the size of allocated memory. (10)

e) In the following enumeration declaration, determine the value of each member. (04)

```
enum name{rahim = -1, karim, salam = 5, riya};
```

6. a) Design a structure "student-record" to contain "name" and "date of birth". Design another structure data type named "date" containing three integer members: day, month, and year. Use the "date" structure to represent the "date of birth" variable of "student-record" structure. (17)

   i) Suppose, we have only two students. You have to take inputs from the user for all of the variables of the structures for these two students, and after that, you have to print all the given input on the output console.

   ii) Write a user-defined function "CalculateAgeDifference" which will take two "student-record" type variables and finally, return a "date" type variable which contains the age difference between two students. (Note: Assume, each month has 30 days).

Sample Input:

```
Name of the student 1 = Rafi
Date of birth of student 1 = 12/11/1996
Name of the student 2 = Riya
Date of birth of student 2 = 1/9/1999
```

Sample Output for "CalculateAgeDifference" function:

```
The age difference between the two is 2 years 9 months 19
days.
```

b) How does a union differ from a structure? Describe with proper example. (05)

c) Suppose, you have 4 files (Test1.c, Test2.c, Test3.c, Test.h). Write an efficient Makefile for these files using dependencies, variables and proper comments. (08)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 2nd Term Examination, 2020
Department of Computer Science and Engineering
CSE 1203
Digital Logic Design

TIME: 1.5 hours FULL MARKS: 120

N.B. i) Answer **ANY TWO** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

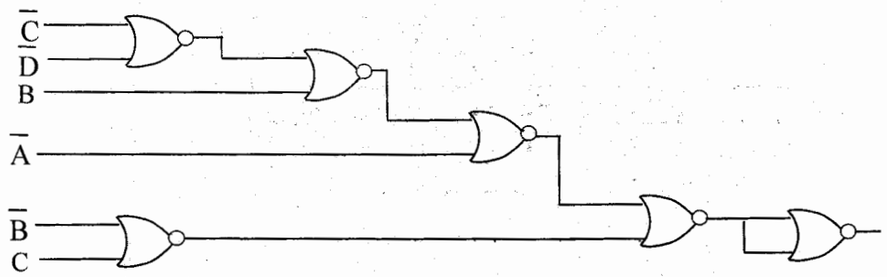
SECTION A

(Answer **ANY TWO** questions from this section in Script A)

1. a) Why 2's complement is used to store a negative value in memory? Explain with a small example. (10)
   b) (i) Add 8765 with 9321 using BCD addition. (08)
   (ii) Add 391 with 375 using Excess–3 addition.
   (iii) Convert binary number 10110 into gray.
   c) What is look ahead carry generator? Why look ahead carry generator is needed? Generate the necessary function for look ahead carry generator. (12)

2. a) How to assign parity bit in 7-bit hamming code. Describe the error detection and correction procedure in 7-bit hamming code using an example. (12)
   b) Design a full sub-tractor using half sub-tractor. (08)
   c) Simplify the Boolean function with minterms $F(w,x,y,z) = \sum(2,5,6,7,10,13,14,15)$ and don't care conditions $d(w,x,y,z) = \sum(0,8)$ (10)

3. a) Convert the following logic diagram into AND-OR logic diagram. (10)



   b) What is the difference between PLA and ROM? When PLA is used instead of ROM? (06)
   c) Design a binary to Excess-3 code converter. (14)

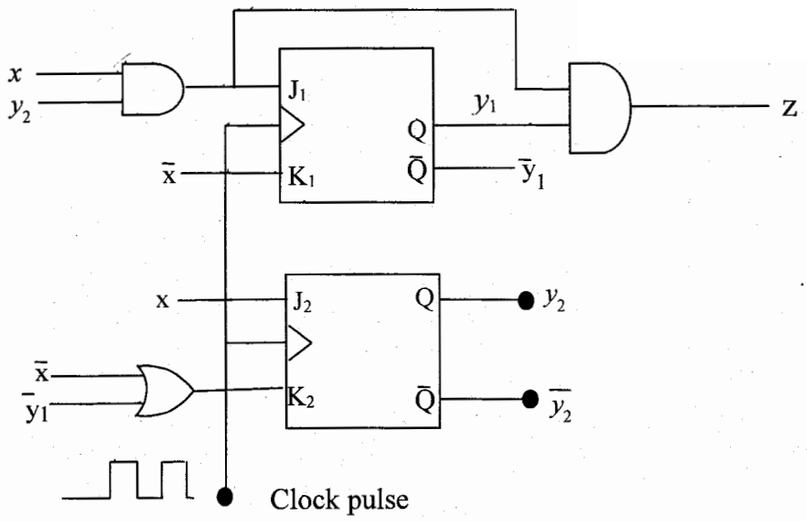
SECTION B

(Answer **ANY TWO** questions from this section in Script B)

4. a) What is a sequential circuit? Explain different kind of sequential circuit models using example(s) (10)
   b) What is a flip-flop? Discuss how a clocked JK flip-flop can be constructed using logic gates. (10)
   c) "If Q' output of a D flip-flop is connected to the D input then it acts as a T–flip–flop." – Justify the statement. (10)

5. a) Explain the steps for sequential circuit design procedure using a simple example. (10)
   b) Design a synchronous counter with T–flip–flop for the binary sequence 0, 1, 4, 5, 7 and repeat. (10)
   c) What is a counter? Draw a circuit diagram of a 4–bit binary ripple counter and explain its operations. (10)

6. a) Why do we analyze sequential circuits?
   b) Analyze the following sequential circuit in terms of the followings:
      (i) Input and output equations.
      (ii) State table and state diagram.



   c) What do you mean by state assignment in designing the sequential circuits? (05)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 2nd Term Examination, 2020
Department of Computer Science and Engineering
CHEM 1207
Chemistry

TIME: 1.5 hours FULL MARKS: 120

N.B. i) Answer **ANY TWO** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY TWO** questions from this section in Script A)

1. a) Draw the crystal structure of silicon. Why silicon is most widely used semiconductor material? (11)
   b) Define isotrophy and auisotrophy. Derive Bragg's law in crystallography. (11)
   c) The unit cell of metallic chromium is body centered cubic. (08)
      i) How many atoms occupy the chromium unit cell?
      ii) What is the mass of chromium unit cell?

2. a) Define molar and equivalent conductances. (08)
   b) HCL shows high conductance. Explain the mechanism. (10)
   c) Outline the working principle of lithium ion battery. (12)

3. a) Define dipole moment of a molecule. What does infra-red do to a molecule, explain with diagrams? (20)
   b) Why solid-electroly interphase (SEI) layer is negative in lithium ion battery, explain? (10)

SECTION B

(Answer **ANY TWO** questions from this section in Script B)

4. a) How can you present the differences between photochemical and thermal reaction? (10)
   b) State and explain the laws of photochemistry. (12)
   c) Calculate the total energy of a photo-chemical reaction where quantum yield is one and the used photon is 100 mole. (08)

5. a) Define thermoplastic and thermosetting polymer giving examples. (10)
   b) Explain the free radical mechanism of polymerization process. (12)
   c) Nylon polymer generally shows high strength. Explain. (08)

6. a) Explain different types of hydrogen bonding with examples. (10)
   b) Outline the electron sea model of metallic bonding. (10)
   c) Predict on the bond order and magnetic nature of O_2 and O_2^{2+} species. (10)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 2nd Term Examination, 2020
Department of Computer Science and Engineering
MATH 1207
Coordinate Geometry and Differential Equations

TIME: 1.5 hours FULL MARKS: 120

N.B. i) Answer **ANY TWO** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY TWO** questions from this section in Script A)

1. a) Define invariants. Determine the transformed equation of $6xy-5y^2=3$, if the axes are rotated through an angle $\theta=\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)$. (14)

   b) Identify the conic $3x^2+4xy+3y^2-2x+2y-7=0$ and find also its standard form. (16)

2. a) Find the cartesian and cylindrical polar coordinates for a point whose spherical polar coordinates are $\left(2\sqrt{21},\tan^{-1}2\sqrt{5},\tan^{-1}\left(-\frac{1}{3}\right)\right)$. (10)

   b) Calculate the angle between the line $\frac{x-3}{6}=\frac{y-2}{3}=\frac{z+1}{-2}$ and the plane $2x+y+2z+5=0$. (10)

   c) Find the equation of the plane which passes through the points (2, 2, 1), (9, 3, 6) and perpendicular to the plane $2x+6y+6z+9=0$. (10)

3. a) Determine the equation of the tangent planes to the sphere $x^2+y^2+z^2-4x+2y-6z+5=0$ which are parallel to the plane $2x+2y-z=0$. (12)

   b) Define skew lines. Find the shortest distance between two lines $x+y=0, z=4$ and $\frac{x-1}{4}=\frac{y-2}{3}=\frac{z-36}{-6}$. (18)

SECTION B

(Answer **ANY TWO** questions from this section in Script B)

4. Answer any three of the followings: (30)

   i) Define order of the differential equation (D.E). Find the D.E of all circles passing through the origin and having their centre on the x-axis.

   ii) Find the general solution of $(1-x^2)\frac{dy}{dx}=x\sqrt{1-x^2}-2xy$.

   iii) Solve the D.E, $\frac{dy}{dx}-2y=xy^3$.

   iv) Solve the D.E, $(x-2y+1)dy=(3x-y)dx$.

5. Answer any two of the followings: (30)

   i) Solve the D.E, $(D^3-2D^2-5D+6)y=e^{2x}$, where $D=\frac{d}{dx}$.

   ii) Solve the D.E, $(D^2+3D+2)y=x\sin x$.

   iii) Solve $\frac{d^3y}{dx^3}+8y=e^{-2x}+x^4+1$.

6. a) Using the method of separations of variables, solve $\frac{\partial^2 u}{\partial x^2}=4\frac{\partial u}{\partial t}$. (12)

   b) Determine the indicial roots and recurrence relation of the differential equation (18)
   $x\frac{d^2y}{dx^2}+\frac{dy}{dx}+xy=0$.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 2nd Term Examination, 2020
Department of Computer Science and Engineering
EEE 1217
Analog Electronics

TIME: 1.5 hours FULL MARKS: 120

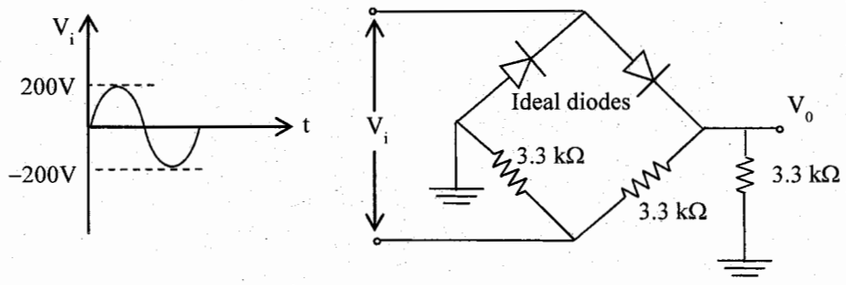
N.B. i) Answer **ANY TWO** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY TWO** questions from this section in Script A)

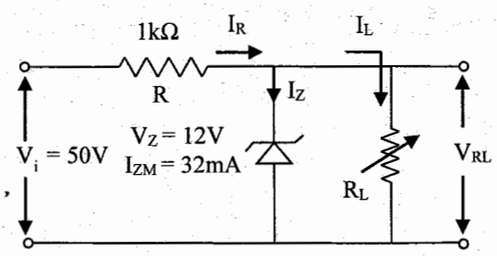
1. a) What are the differences between zener diode and rectifier diode? How can a zener diode be used as voltage stabilizer? (10)

b) Sketch V_0 for the following network and determine the dc voltage available. (10)

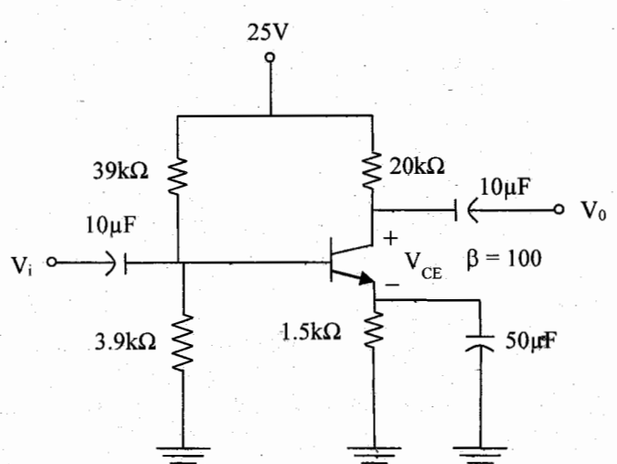


c) State α and β for both DC and AC mode. Derive $\beta = \frac{\alpha}{1-\alpha}$ for transistor, where symbols bear their usual meanings. (10)

2. a) For the network shown in the following figure, determine the range of R_L and I_L that will result constant output voltage $V_{RL} = 12V$. (12)



b) Determine the dc bias voltage V_{CE} and current I_C for the network given below. (13)



c) Draw the Darlington configuration and obtain the overall β_D expression. (05)

3. a) What is meant by the term "hybrid parameter"? Given that $I_E = 2.5$ mA, $h_{fe} = 150$ μS, $h_{oe} = 20$ μS, and $h_{ob} = 0.5$ μS. Determine, (12)
i) The common-emitter hybrid equivalent circuit and
ii) The common-base r_e model.

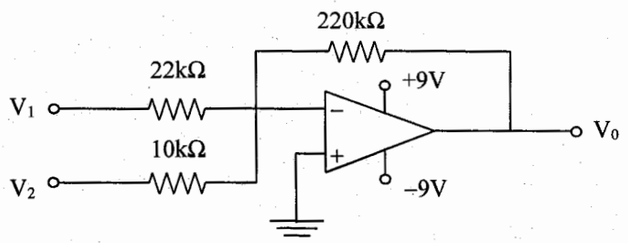
b) Design a CMOS circuit which acts as a logic inverter. (10)
c) Graphically justify that depletion type MOSFET can be used as both depletion and enhancement type. (08)

SECTION B

(Answer **ANY TWO** questions from this section in Script B)

4. a) By using proper illustration, explain the working principle of SCR as half-wave rectifier. Also, obtain the expression of average output voltage and current. (10)
b) Design an UJT relaxation oscillator circuit. Draw the characteristics curve of TRIAC and UJT with mentioning all significant points. (10)
c) Briefly explain holding current. A 20V r.m.s. supply is connected to a full-wave SCR circuit that is triggered at 60°. What is the dc voltage and current delivered to the load, where load resistance = 150 Ω. (10)

5. a) Mention the basic features of an op-amp. Design an op-amp circuit which act as a differentiator. (10)
b) Design and explain a second order low pass active filter with neat sketch. (10)
c) Briefly explain on slew rate. Calculate the output voltage for the following circuit. The inputs are $V_1 = 100mV\sin(500t)$ and $V_2 = 50mV\sin(1000t)$. (10)



6. a) Briefly explain on UPS. Design a dc power supply using a full-wave bridge rectifier, capacitor and RC filter, and IC voltage regulator to provide an output of +24V. (09)
b) Explain the working principle of phase shift oscillator. Why crystal oscillator is better than RC and LC oscillators? (11)
c) Why IC is needed? A crystal has L = 3H, C = 0.05pF, R = 1KΩ, and C_m = 10pF. Calculate the series-resonant and parallel-resonant frequencies of the crystal. (10)