College of Engineering, Pune
End Semester Exam – April 2011 / May-2011
S.Y. B. Tech.
CT-206 Computer Graphics (2003 Course)

Day & Date:- 5.5.11 **April 2011** **Time:-** 02.00 to 05.00
Maximum Marks: 50 **Duration:- 3 hrs.**

Instructions: 1. All questions are compulsory
2. Draw neat figures wherever necessary
3. Figures to the right indicate full marks.

Q. 1. A) Derive the expression for Decision Parameter used in Bresenham's Circle Algorithm. 5

B) Explain what do you mean by graphics primitives. Explain the features of display file structure and display file interpreter. 5.

OR

What is antialiasing? Explain various antialiasing methods 5.

Q. 2. A) Explain and Compare Seed Fill & Edge Fill Algorithms for polygon. 5.

OR

Explain various methods used to find whether a point is inside or outside a polygon. 5.

B) Find out the coordinates of a figure bounded by (0,0), (1,5), (6,3),(-3,-4) when reflected along the line whose equation is $y = 2x+4$ and sheared by 2 units in x direction and 2 units in y direction.. 8.

Q. 3. A) What is Segment? Explain Segment table and different operations performed on it. 6.

OR

Describe the different steps involved in 2D world co-ordinate system to viewing co-ordinate transformation. Also obtain the transformation in matrix form. 6

B) Explain Cohen-Sutherland algorithm. If this algorithm is used to clip two lines P1(40,15), P2(75,45) and P3(70,20) P4(100,10) against a window A(50,10), B(80,10), C(80,40), D(50,40). Find intersection points with clipping window. 8.

Q. 4 A) Derive the general equation of parallel projection on to a given view plane in the direction of given projector. 5.

OR

Explain Parallel & Perspective projections Also State the types of Parallel and Perspective Projections? 5.

B) A triangle is defined by 3 vertices A(0,2,1), B(2,3,0), C(1,2,1). Find the final coordinates after it is rotated by 45° around a line joining the points (2,2,2) and (1,1,1). 8.

College Of Engineering, Pune

END-SEM EXAM

(CT 209) Theory of Computer Science (TCS)

S.Y. B.Tech. (Computer Engineering)

Year: 2010-11 Semester: IV Date: 26/04/2011

Duration: 3 hrs Max. Marks: 100

Instructions to candidates:

1. Answer any **five** questions.
2. Figures to the right indicate full marks.
3. Draw neat diagrams wherever necessary.
4. Take appropriate examples wherever necessary.
5. Justify/elaborate important steps in solutions. Answers without proper justification will not get any mark(s).
6. Write precise answers. Use your judgment while writing proofs/justifications and avoid too short/too long answers (rough guideline is to write at most a full page for four marks).
7. Write all bits of a question together as far as possible.
8. Don't leave blank pages/space between answers.

Q.1. A. Find regular expressions representing the sets of strings over {a, b}* with following properties: Marks 8

i. All strings having at most two a's
ii. All strings in which the number of occurrences of a is divisible by 3
iii. All strings in which there are at least two occurrences of b between any two occurrences of a
iv. All strings having at least one occurrence of three consecutive b's

B. For the regular expression 00(0+1)* 12

i. Construct ε-NFA
ii. Construct NFA from the ε-NFA constructed in (i)
iii. Construct DFA from the NFA constructed in (ii)

Q.2. A. Describe (in English) the language corresponding to each of the following regular expressions: 8

i. (a + b)*a(ε+bbbb)
ii. (a(a+bb)*)*
iii. ((a+b)a)*
iv. (a(aa)*b(bb)*)*

B. Prove/disprove following identities for regular expressions: 6

i. (R + S)* = R* + S*
ii. (R + S)*S = (R*S)*

Marks

Q.2. C. Identify the regular expression corresponding to the DFA given below (Fig – 1): 6

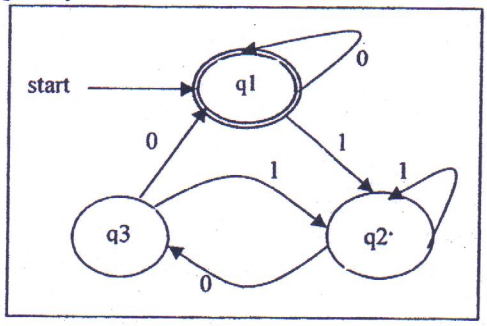


Fig - 1

Q.3. A. Prove that following languages are not regular: 6

i. $L = \{0^i1^j0^k \mid k > (i + j)\}$

ii. $L = \{0^i1^j \mid j \text{ is a multiple of } i\}$

B. Check if following DFAs are equivalent: 6

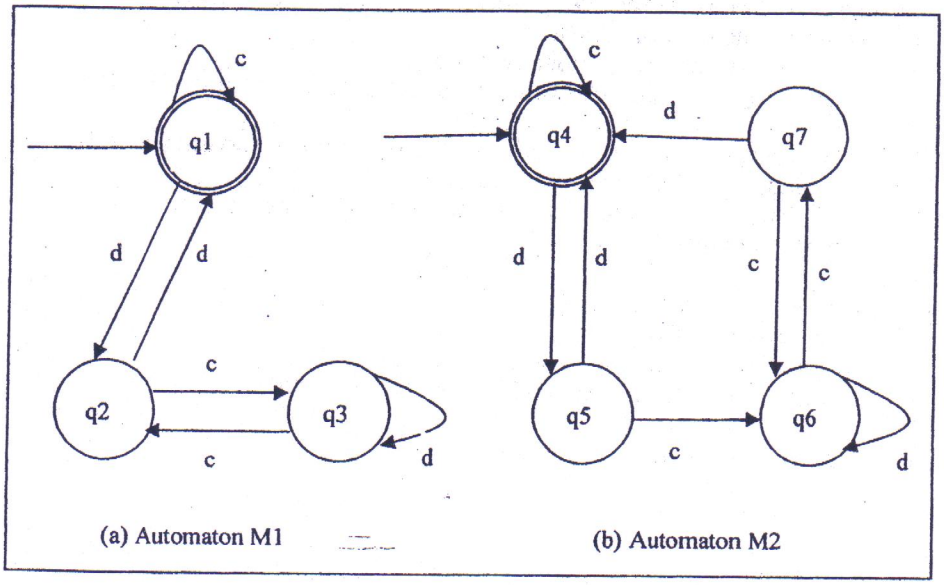
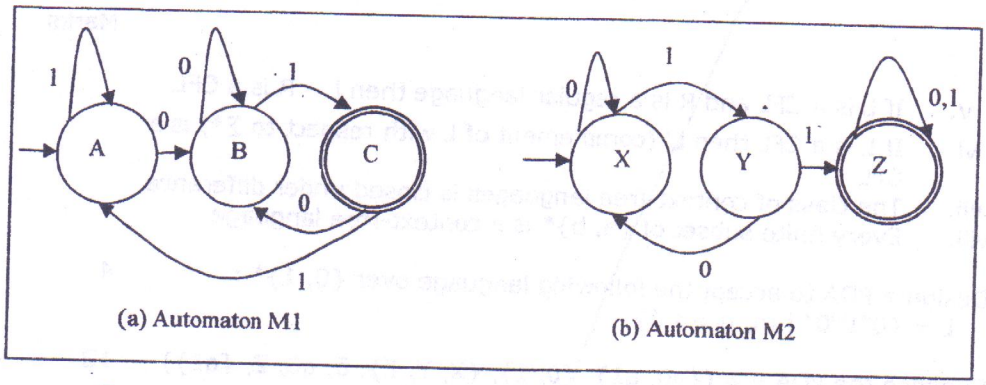


Fig - 2

Marks

C. Let L1 and L2 be the regular languages over {0, 1}* recognized by the DFAs M1 and M2 respectively as given below: 8



Draw FAs recognizing the following languages:

i. L1 U L2
ii. L1 ∩ L2
iii. L1 – L2
iv. L1' (Complement of L1 with respect to {0, 1}*)

Q.4. A. Describe (in English) the languages generated by following CFGs. Justify your answer in each case. 6

i. $S \rightarrow 0S0 \mid 1S1 \mid A \quad A \rightarrow 2B3 \quad B \rightarrow 2B3 \mid 3$
ii. $S \rightarrow aX \mid bS \mid a \mid b \quad X \rightarrow aX \mid a$

B. For each of the CFG given below, state if it is ambiguous or not. Justify your answers. 9

i. $S \rightarrow aSa \mid bSb \mid a \mid b$
ii. $S \rightarrow SS \mid a \mid b$
iii. $S \rightarrow ABA \quad A \rightarrow aA \mid \varepsilon \quad B \rightarrow bB \mid \varepsilon$

C. State pumping lemma for CFLs (proof is NOT expected). Prove that following language is not CFL using pumping lemma. 5

$L = \{a^i b^j c^k \mid i < j < k\}$

Q.5. A. Reduce the following grammar to Chmosky normal form (CNF): 12

$S \rightarrow AACD$
$A \rightarrow aAb \mid \varepsilon$
$C \rightarrow aC \mid a$
$D \rightarrow aDa \mid bDb \mid \varepsilon$

B. State whether the following statements are true or false (justifications not expected): 8

i. A regular language is context-free
ii. There exist context-free languages that are not regular
iii. The class of context-free languages is closed under union
iv. The class of context-free languages is closed under intersection

Marks

v. If L is a CFL and R is a regular language then L – R is a CFL

vi. If L is a CFL then L' (complement of L with respect to Σ^*) is a CFL

vii. The class of context-free languages is closed under difference

viii. Every finite subset of {a, b}* is a context-free language

Q.6. A. Design a PDA to accept the following language over {0, 1}* : 4

$L = \{0^n1^m0^n \mid m, n >= 1\}$

B. Suppose the PDA P = ({q0, q1}, {0, 1}, {X, Y, Z}, δ, q0, Z, {q1}) has the following transition function: 12

δ(q0, 0, Z) = {(q1, Z)} .
δ(q0, 0, X) = {(q0, ε)}
δ(q1, 0, Z) = {(q1, YZ)}
δ(q1, 0, Y) = {(q1, YY)}
δ(q0, 1, Z) = {(q0, XZ)}
δ(q0, 1, X) = {(q0, XX)}
δ(q1, 1, Z) = {(q0, Z)}
δ(q1, 1, Y) = {(q1, ε)}

i. Starting from the initial ID show all the reachable IDs when the input is w = 000011

ii. Convert P to another PDA P1 that accepts by empty stack the same language that P accepts by final state; i.e. N(P1) = L(P)

iii. Find a PDA P2 such that L(P2) = N(P); i.e. P2 accepts by final state when P accepts by empty stack.

C. Convert the following grammar to a PDA that accepts the same language by empty stack. 4

$S \rightarrow 0AA$
$A \rightarrow 0S \mid 1S \mid 0$

COLLEGE OF ENGINEERING, PUNE
(An autonomous Institute of Government of Maharashtra)

End-Semester Examination

CT-213 Principles of Communication Engineering
Class: - S.Y BTech (Information Technology)

Year: - 2010-11 Semester: -IV
Duration: - 3 hrs. Max. Marks: - 50

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Draw neat figures wherever required.

GROUP –A (Multiple Type Questions)

Q.1 *Choose the correct alternatives for any six of the following:* 6*1=6

1) The modulation index in amplitude modulation is changed from 0 to 1 .The transmitted power is
   a. Unchanged
   b. Halved
   c. Doubled
   d. Increased by 50%

2) A signal g(t) is said to be periodic if for some positive constant To
   a. g(t)=g(t +To)
   b. g(t)=g(t-To)
   c. g(t)=g(t + T)
   d. g(t)=g(To -t)

3) An FM signal with a deviation δ is passed through a mixer and has its frequency reduced fivefold. The deviation in the output of the mixer is

   a) 5δ b)indeterminate
   c) δ/5 d)δ

4) In a commercial FM broadcast the modulating frequency is limited about

   a)3.4 kHz b)5 kHz c) 15 kHz d) 25 kHz.

5) SSB system is not used for broadcasting because
   a) there will be poor fidelity as only one side band is transmitted
   b) there is more power in side bands

c) transmitters and receivers are complicated
d) all of these

6) If the SNR of the signal is increased, then the channel capacity
a) is increased b)is decreased
c) Remains constant d) cannot be determined.

7) Which of the following gives maximum probability of error
a) ASK b) FSK c) PSK d) DPSK.

8) A broadcast radio transmitter radiates 20 kW when the modulation percentage-is 60. The carrier power will be-
a)1.2kW b)1.45 kW
c)16.94 kW d)20 kW.

GROUP B Short Answer Type Questions
Answer any FIVE of the following

1) Draw the corresponding PAM, PWM and PPM signal waveforms with reference to an arbitrary message signal waveform. 4*5=20

2) Distinguish between ASK, FSK and PSK in terms of their performances.

3) Write a short note on Predictability theory and Delta Modulation.

4) Relate Nyquist & Shannon formulation assuming spectrum of a channel between 3MHz and 5 MHz and SNRdb=24db.Find the number of discrete signal or voltage levels.

5) Assuming a maximum frequency deviation of 5 kHz and a maximum modulating frequency of 2.5 kHz, calculate the bandwidth by Carson's rule.

Distinguish between periodic and non-periodic signals.

6) 1)To avoid aliasing, find the-Nyquist rate of the signal
$X(t) = 8 \cos 200 nt$.
2) Encode the bit sequence 1011011 in the NRZ-polar and RZ-bipolar format.

College of Engineering, Pune

S.Y.B.Tech- Computer Engineering and Information Technology

END SEMESTER EXAM

CT-207- MICROPROCESSOR TECHNIQUES

Date- 30/04/2011 Timing: 3 hrs

Academic Year: 2010- 11 Max. Marks: 100

Instructions:

1. Answer all Questions.
2. Draw neat diagrams wherever necessary.
3. Make appropriate assumptions if required.
4. Figures to the right indicate full marks.

Q. 1 Give the neat system schematic for interfacing following to the 8086 based system. **Marks 18**

1. 64 KWord of RAM using 64 Kbytes RAM Chips from address 00000H onwards.
2. 32 KWord of EPROM using 32 Kbytes EPROM Chips. Ending address of the EPROM is FFFFFH.
3. 8255 in I/O mapped mode with address of Port A (PA) FF80 H.

Give the addresses for each chip.

Q. 2 A. Briefly explain the action of 8086 when NMI and INTR pins are activated. **06**

B. The physical branch address is 5A230 H, when CS=5200 H. What will be the physical address if CS is changed to 7800 H? **04**

C. What are the contents of data bus and the status of A0 and BHE# for the following activity to be performed by 8086? **04**

1. CPU writes a byte A5H at memory location 1000H:0002H
2. CPU writes a word 227DH at memory location 1000H:0003H

D. What is the purpose of status bits S3 and S4? **02**

Q. 3 A. What is the response of 8086 to HOLD signal? **04**

B. Explain the following with respect to 8237 DMA Controller **12**

1. The signals AEN,EOP#
2. Single Transfer Mode
3. Memory to Memory transfer

What will be the contents of registers and memory referred after the execution of following 8086 assembly language program?

```
        .MODEL SMALL
        .STACK 100
        .DATA
NUMS    DB 56H, 38H, 09H, 98H, 99H
RESLT   DB?
        .CODE
        LEA BX, NUMS
        MOV CL, 0AH
        MOV AL, 00
REPT:   CMP AL, [BX]
        JNC AHEAD
        MOV AL, [BX]
AHEAD:  INC BX
        DEC CL
        JNZ REPT
        MOV RESLT, AL
        END
```

B. Ten 8 bit numbers are available from address 00440H .Write an assembly language program in 8086 to separate out Odd numbers and Even numbers. The Odd numbers are to be stored from 00460H onwards and the Even numbers are to be stored from 00480H onwards. **08**

OR

B. Write an assembly language program in 8086 to reverse the given ASCII String of four characters. **08**
For example PART is to be reversed to TRAP.

Q. 5 A Consider 8086 based system having 8259 PIC for managing the Interrupts. There are two I/O devices DEV1 and DEV2. DEV1 is interrupting on IR0 of 8259 and DEV2 is interrupting on IR3 of 8259.An ISR for DEV1 is available at address 005800H onwards and an ISR for DEV2 is available at address 006800H onwards. The IP and CS of DEV1 ISR are stored at address 00100H onwards in Interrupt Vector Table. **14**
Give the system schematic for 8259 interfacing and the steps for initializing 8259 assuming default priority mode and Level triggered interrupt mode.
At what address IP and CS of DEV2 ISR will be stored in Interrupt Vector Table?

B With a neat timing diagram explain the data transfer from port B of 8255 to 8086 in interrupt driven mode 1. **04**

Q. 6 A. Explain mode 2(Rate Generator) and mode 5(Hardware Triggered Mode) of 8253 /8254 with suitable waveforms. 08

B. Explain the following with respect to 8279 08
1. Right Entry Display
2. Left Entry Display
3. Display RAM

OR

B Answer the following 08
i. How does synchronous serial communication differs from asynchronous serial communication?
ii. How to confirm reception of serial communication is error free for every character while using 8251 USART?

College of Engineering, Pune
End Semester Examination –April 2011

S.Y. B.Tech. Branch: Computer and IT
MA 221: Engineering Mathematics-IV

Day & Date: Saturday, 7th May, 2011 **Time:** 2.00 P.M. To 5.00 P.M
Maximum Marks: 50 **Duration: 03 hrs**

Instructions:
1. All questions are compulsory.
2. Answers to different sections must be written on separate answer books clearly mentioning the Section Number on the top of the answer books.
3. Neat diagrams must be drawn wherever necessary.
4. All symbols have their usual meanings.
5. Figures to the right indicate full marks.
6. Use of nonprogrammable electronic pocket calculator, mollier charts, steam tables and statistical table are allowed.

Section I

Q.1. Attempt any three of the following **Marks**

(a) If a car agency sells 50% of its inventory of a certain foreign car equipped with airbags, find a formula for the probability distribution of the number of cars with airbags among the next 4 cars sold by the agency and also find the cumulative distribution. (3 marks)

(b) Given the joint density function $f(x,y)=\begin{cases}\frac{x(1+3y^2)}{4}, 0<x<2, 0<y<1\\ 0, \text{ elsewhere}\end{cases}$

find g(x),h(y),F($x|y$) and evaluate $P(1/4<X<1/2|Y=1/3)$. (3 marks)

(c) Suppose that the shelf life, in years, of a certain perishable food product packaged in cardboard containers is a random variable whose probability density function is given by

$$f(x)=\begin{cases}e^{-x}, x>0\\ 0, \text{ elsewhere}\end{cases}$$

Let X_1, X_2 and X_3 represent shelf lives for three of these containers selected independently and find $P(X_1<2, 1<X_2<3, X_3>2)$. (3 marks)

(d) Suppose that the number of cars X that pass through a car wash between 4.00 P.M. and 5.00 P.M. on any sunny Friday has the following probability distribution:

x	4	5	6	7	8	9
P(X=x)	1/12	1/12	1/4	1/4	1/6	1/6

Let g(X) = 2X-1 represent the amount of money in dollars, paid to the attendant by the manager. Find the attendant's expected earning for this particular time period. (3 marks)

Q.2. Attempt any three of the following **Marks**

(a) Let X be a random variable having the density function given by

$$f(x)=\begin{cases}\frac{x^2}{3}, -1<x<2\\ 0, \text{ elsewhere}\end{cases}$$

Find the variance of the random variable g(X) = 4X+3. (3 marks)

(b) The fraction X of male runners and the fraction Y of female runners compete in Marathon races is described by the joint density function

$$f(x)=\begin{cases}8xy, 0\le x\le 1, 0\le y\le x\\ 0, \text{ elsewhere}\end{cases}$$

Find the covariance of X and Y. (3 marks)

(c) A random variable X has a mean $\mu=8$, a variance $\sigma^2=9$, and an unknown probability distribution. Find $(i) P(-4<X<20)$ (ii) $P(|X-8|\ge 6)$. (3 marks)

(d) Given a normal distribution with $\mu=40$ and variance $\sigma^2=6$, find the value of x that has (i) 45% of the area to the left, and (ii) 14% of the area to the right. (3 marks)

Q.3. Attempt any two of the following **Marks**

(a) Find the moment generating function of the binomial random variable X and then use it to verify that $\mu=np$ and $\sigma^2=npq$. (3 marks)

(b) A random sample of 100 recorded deaths in India during the past years showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance. (3 marks)

(c) Find the least- squares regression line of y on x for the following data: (4 marks)

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

Section II

Q.4. Attempt any three of the following **Marks**

(a) Given $L\{2\sqrt{(t/\pi)}\}=1/s^{3/2}$, show that $L\{1/\sqrt{\pi t}\}=1/\sqrt{s}$. (3 marks)

(b) Draw the graph of the periodic function

$$f(t)=\begin{cases} t\ ,0<t<\pi \\ \pi-t\ ,\pi<t<2\pi \end{cases}$$ and find its Laplace transform. (3 marks)

(c) Evaluate $L^{-1}\ [\cot^{-1}(\frac{s+a}{b})]$. (3 marks)

(d) Using Convolution theorem, evaluate $L^{-1}\left\{\frac{1}{(s+a)(s+b)}\right\}$. (3 marks)

Q.5. Attempt any three of the following **Marks**

(a) Express the function $f(x)=\begin{cases}1\ for\ |x|\le 1\\ 0\ for\ |x|>1\end{cases}$ as a Fourier integral. Hence

evaluate $\int_0^\infty \frac{\sin\lambda\cos\lambda x}{\lambda}d\lambda$. (3 marks)

(b) Solve the integral equation

$$\int_0^\infty f(\theta)\cos\alpha\theta d\theta=\begin{cases}1-\alpha, 0\le\alpha<1\\ 0\quad ,\alpha>1\end{cases}$$ and hence

evaluate $\int_0^\infty \frac{\sin^2 t}{t}dt$. (3 marks)

(c) Find the inverse Fourier sine transform of $\frac{e^{-as}}{s}$. (3 marks)

(d) Show that the Fourier transform of $e^{-x^2/2}$. (3 marks)

Q.6. Attempt any two of the following **Marks**

(a) Using Laplace transform solve $\frac{d^2y}{dx^2}+n^2y=a\sin(nt+\theta), y(0)=y'(0)=0$. (3 marks)

(b) The co-ordinates (x, y) of a particle moving along a plane curve at any time t, are given by $\frac{dy}{dt}+2x=\sin 2t, \frac{dx}{dt}-2y=\cos 2t\ (t>0)$. If at $t=0$, x=1 and y=0, show by transform, that the particle moves along the curve $4x^2+4xy+5y^2=4$. (3 marks)

(c) Using appropriate Fourier transform method solve $\frac{\partial u}{\partial t}=2\frac{\partial^2 u}{\partial x^2}$, (4 marks)

if $u(0,t)=0, u(x,0)=e^{-x}(x>0), u(x,t)$ is bounded when $x>0$, $t>0$.

College of Engineering, Pune
End Semester Exam – May 2011
S. Y. B. Tech. (Computer Engineering, Information Technology)
(CT-208)- (Principles of Programming Languages)

Day & Date- Tuesday, 3 May 2011 | Time: - 2pm to 5pm
Maximum Marks: 50 | Duration – 3 hrs.

Instructions:

1. All questions are compulsory.
2. Write indented and commented code.
3. This is an open book exam. You can carry any amount of study material with you, but must not exchange it with others.
4. Make suitable assumptions if required, and state them in your answer.

Q 1 **A** What will be the output of the following C Program and why? **Marks**

```
#include <stdio.h>
int i = 10;
int main() {
   int j = 20;
   j = j + i + ++i;
   printf("%d\n",j);
}
```

[2]

B Comment in 3-4 sentences on the following statement using an example in any programming language: *Exception handling leads to cleaner code.* **[2]**

C What is a possible size for the following union, assuming 32-bit processor? Also, what is the offset of y.c[2] from the beginning of the union u? Explain your answer. **[2]**

```
union uu {
        struct x {
                int x;
                char c[3];
        }y;
        int a[2];
        char *chp[3];
}u;
```

D Write a LISP language function for finding the minimum value in a list of integers. **[2]**

E Write your views in 3-4 sentences on the following statement: **[2]**
Garbage collection is not possible for C language.

Q2 **A** Write True of False with reasoning: **[2]**
1) LISP language has low performance because it is dynamically typed.
2) HTML can be used as a language for completely designing a software for a bank.

B **Given**:
a) Following decreasing precedence order + * – /
b) Associativity left to right for +,- and right to left for * /
Problem:
1) What is the value of the following expression
`10 + 20 * 30 * 20 + 10 - 30 * 20` **[1]**
2) What is the value of the following expression
`1 * 2 * 3 - 21 / 5` **[1]**

C Write any simple and small python program to illustrate inheritance and virtual functions. **[2]**

D Draw flowcharts for any two prime-programs using 6 nodes. **[2]**

E Suppose you are designing a new language for facilitating writing of web applications. *Would you like to include a "goto" statement in the language? Justify your answer.*

Q3 A Write assembly equivalent for the following program segment: Using syntax similar to x86 processor's assembly language and using convention source first, target later. [5]

```
int f(int a) {
        switch(a) {
                case 10:
                        return 20;
                case 20:
                        a = a + 20;
                        break;
                default:
                        a = a + 30;
                        break;
        }
        return a + 10;
}
```

B Try writing the C-equivalent of the following Python program. [5]

```
#!/usr/bin/python
class person:
        def __init__(self, name, phone):
                self.name = name
                self.phone = phone
        def __str__(self):
                return self.name + " " + str(self.phone)
class customer(person):
        def __init__(self, name, phone, custid):
                person.__init__(self, name, phone)
                self.custid = custid
        def __str__(self):
                return person.__str__(self)+ " "
                        + str(self.cust
        def update_custid(self, newcustid):
                self.custid = newcustid
class test:
        def __init__(self):
                self.p = person("abhijit", 9422038125)
                self.c = customer("vaibhav", 112333422,
                                213112)
        def run(self):
                print self.p
                print self.c
                self.c.update_custid(2222222)
                print self.c

t = test()
t.run()
```

Q4 **A** **Given:** Consider the following code written NOT in C, but using C like syntax and scope rules like C. [5]

```
int i = 10, j = 20;
int best(int a, int b) {
        a = b + j;
        return a;
}
void test(int m) {
        m = i + j;
        j = best(m, j);
}
int main() {
       int k = 80;
       test(i);
}
```

Problem: Write an explanation for the values in i, j, and k at the end of program when the parameter passing method is:

1.Pass by Value

2.Pass by Reference

3.Pass by Value Result

B Write a pthreads based concurrent program in C for quicksort of integers. Try to ensure that too many threads are *not* created. [5]

Q5 **A** Draw a diagram of all memory allocations with values of each variable clearly indicated, in the following program, when the control is at line (B). [5]

```
#include <stdio.h>
#include <stdlib.h>
#include <strings.h>
char ga[12];
int *gip;
static int e = 200;
int f(int y, int z) {
        ga[10] = 'c';
        y = ga[2] + e; /* line (B) */
        return y;
}
int g(int a) {
        int d = a;
        int *p = (int *)malloc(3*sizeof(int));
        p[0] = p[1] = 100;
        d = f(e, p[1]) + 20;
        return d;
}
int main() {
        int p = 50;
        gip = &p;
        strcpy(ga, "verygood");
        gi = g(p);
}
```

B Write BNF Grammar to describe the syntax of variable declarations in C language. You can make suitable assumptions for the grammar of writing a type declaration. [5]