TMA–402

B. TECH. (CS/IT)
(FOURTH SEMESTER)
MID SEMESTER EXAMINATION, 2018
COMPUTER BASED NUMERICAL AND
STATISTICAL TECHNIQUES (CBNST)

Time : 1 : 30 Hours

Maximum Marks : 50

Note :(i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False :   (1×5=5 Marks)

(a) If $f(0) = -3$, $f(1) = 6$, $f(2) = 8$ and $f(3) = 12$, then $\Delta^3 f(0)$ is equal to ....

(b) Starting from $x_0 = 1$, one step of Newton-Raphson method in solving the equation $x^3 + 3x - 7 = 0$ gives the next value (x_1) is ....

(i) 0.5

(ii) 1.406

(iii) 1.5

(iv) 2

(c) If $f(x) = x^3$, then the 3rd order divided difference of $f(x)$ at 1, 2 and 3 is equal to ....

(d) The rate of convergence of Newton-Raphson method is 2.   (True/False)

(e) Fixed point iteration method for $f(x) = 0$ is applicable if :

   (i) $|\phi'(x)| > 1$

   (ii) $|\phi'(x)| < 1$

   (iii) $\phi'(x) < 1$

   (iv) $\phi'(x) = 0$

2. Attempt any *five* parts :   (3×5=15 Marks)

(a) If 0.333 is the approximate value of $\frac{1}{3}$, then find absolute, relative and percentage errors.

(b) Given the $u = \dfrac{5xy^2}{z^3}$, $\Delta x, \Delta y$ and Δz denote the errors in x, y and z respectively, such that $x = y = z = 1$ and $\Delta x = \Delta y = \Delta z = 0.001$. Find the maximum relative error in u.

(c) Find a positive real root of $x\,e^x = 1$ by bisection method performing three iterations between 0 and 1.

(d) Evaluate $\Delta^3 (1-x)(1-2x)(1-3x)$.

(e) Express the function $2x^3 - 3x^2 + 3x - 10$ in factorial notation.

(f) Construct a forward difference table for the data given below :

x	y
2	5
3	10
4	15
5	15

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Solve the following system of equations :
$x + y - z = 0,\ -x + 3y = 2,\ x - 2z = 3$
by the Gauss-Seidel method. Assume the initial solution $X = (0.8, 0.8, 2.1)^t$.

(b) If $u_0 = 3$, $u_1 = 12$, $u_2 = 81$, $u_3 = 2000$, $u_4 = 100$, calculate $\Delta^4 u_0$.

(c) Compute the percentage error in the time period $T = 2\pi\sqrt{l/g}$ for $l = 1$ M, if the error in measurement of $l = 0.01$.

4. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Evaluate $\nabla^3 \log 40$ and $\nabla^4 \log 50$ for the data given below :

x	$y = \log x$
10	1
20	1.3010
30	1.4771
40	1.6021
50	1.6990

(b) Using Newton's method find a real root of the equation $x \log_{10} x = 1.2$, correct to two decimal places between 2 and 3.

(c) Evaluate :

$$\Delta^{10} (1 - ax)(1 - bx^2)(1 - cx^3)(1 - dx^4)$$

if $h = 1$.

5. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Solve the following equations by Gauss's elimination method :

$$2x_1 + 4x_2 + x_3 = 3$$
$$3x_1 + 2x_2 - 2x_3 = -2$$
$$x_1 - x_2 + x_3 = 6$$

(b) Find the missing value of the following data :

x	y
1	7
2	—
3	13
4	21
5	37

(c) Fit a polynomial of degree three which takes the following values :

x	$y = f(x)$
0	1
1	2
2	1
3	10

Roll No. ....

TCS–402

B. TECH. (CS/IT)
(FOURTH SEMESTER)
MID SEMESTER EXAMINATION, 2018
FINITE AUTOMATA AND FORMAL
LANGUAGES

Time : 1 : 30 Hours

Maximum Marks : 50

Note :(i) This question paper contains two Sections—Section A and Section B.

(ii) Both Sections are compulsory.

Section—A

1. Attempt all multiple choice questions choosing the correct option : (1×5=5 Marks)

(a) If two finite state machines are equivalent, they should have same number of ....

(i) Edges

(ii) States

(iii) Edges and States

(iv) None of the above

(b) Which string is not accepted by the FSA for language L = {w ε (0, 1)*/ second symbol of w is "0" and fourth is "1"} ?

(i) 00111

P. T. O.

(ii) 00101

(iii) 00110

(iv) 10010

(c) A language L is accepted by a DFA if and only if it is :

(i) Recursive

(ii) Regular

(iii) Context free

(iv) Context Sensitive

(d) For which of the following applications regular expressions can be used ?

(i) Designing compilers

(ii) Developing text editors

(iii) Simulating sequential circuits

(iv) All of the above

(e) A language is represented by a regular expression (aa) * (bba + aba). Which of the following string belong to the regular set represented by the above expression ?

(i) bbaaa

(ii) aaaba

(iii) abaaa

(iv) aabbaba

2. Attempt any *five* parts :   (3×5=15 Marks)

(a) Define deterministic finite automata and its tuples with suitable example.

(b) Differentiate between DFA and NFA using *two* suitable examples.

(c) Give basic steps for construction of NFA from NFA with ε-transition.

(d) Find a regular expression to the language of all string over input $(0, 1)^*$ containing exactly two 0's.

(e) Write down closure properties of regular sets.

(f) Provide an explanation that why Palindromes can't be recognized by any FSM.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Design NFA for the language L, where L = {all strings over input (0, 1) that have at least two consecutive 0's or 1's}.

(b) Construct DFA which reject set of all strings containing exactly four "0" in every string over alphabet $\Sigma = \{0, 1\}$.

(c) Convert the NFA given in the following table to its corresponding DFA. Here q_0 is initial and q_2, q_4 are final states :

State	Input	
	a	b
→ q_0	q_0 q_2	q_3 q_1
q_1	q_2 q_3	$q_1 q_0$
q_2^*	q_3 q_2	q_4
q_3	q_0 q_1 q_2	q_0 q_3 q_4
q_4^*	q_0	q_4 q_2

4. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

   (a) Explain construction of regular expression from DFA using Arden's theorem by taking suitable example.

   (b) Construct a Moore machine which is equivalent to the Mealy machine defined by table given below, here q_1 is initial state :

Present States	For Input a = 0		For Input a = 1	
	state	output	state	output
q_1	q_3	1	q_2	1
q_2	q_1	0	q_4	1
q_3	q_2	0	q_1	1
q_4	q_4	0	q_3	1

(c) Construct a minimum state automaton equivalent to give automaton M whose transition table is defined by table given below. Here q_0 is initial and q_6, q_7 are final states :

State	Input	
	a	b
q_0	q_0	q_3
q_1	q_2	q_5
q_2	q_3	q_4
q_3	q_0	q_5
q_4	q_0	q_6
q_5	q_1	q_7
q_6	q_1	q_3
q_7	q_0	q_5

5. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

   (a) Design NFA for regular expression $(10)^*1 + 10(0+1)^*1 + (010+110)^*$.

   (b) Prove or disprove regularity of language $L = \{0^n 1^n / n >= 1\}$ using pumping lemma.

   (c) Construct NFA for the set of all strings over the alphabet $\{0, 1\}$, where 5th symbol from right is a '1'.

Roll No. ....

TCS–403

B. TECH. (CS/IT) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, 2018

MICROPROCESSORS

Time : 1 : 30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) In a 4096 × 8 EPROM needs .... address lines.

(b) Total numbers of T states required to complete IN 30H ....

(c) The instructions INR M belongs to which addressing modes of 8085 ....

(d) While SIC no flags are affected in 8085 ?
(True/False)

(e) What is the PC when RST6 is used in 8085 .... ?

2. Attempt any *five* parts :   (3×15=15 Marks)

(a) What operation can be performed by using the instruction SUB A ? Specify the status of Z and CY ?

(b) Write instructions to load the hexadecimal numbers 65H in register C and 92H in the accumulator A. Display the number 65H at PORT0 and 92H at PORT1 ?

(c) How many times the instruction sequence below will loop before coming out of loop is ?

MVI A 00H

GEU : INR A

JNZ GEU

(d) What are the differences between memories mapped I/O and I/O mapped I/O ?

(e) Explain the System Bus of 8085 microprocessor.

(f) Explain the function of ALE and 1O/M signals in the 8085 architecture.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Draw the detailed architecture of 8085 microprocessor.

(b) Write a program in 8085 which adds two 16 bit numbers which are stored in a memory location starting at 2050H by using minimum number of instructions and store the result memory location starting at 3050H.

(c) Draw the programming model of 8085 and explain the memory registers of 8085.

4. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Explain the control signals of 8085 microprocessor.

(b) Write an assembly language program in 8085 which counts the number of l's in the content of D register and store the count in B register.

(c) Explain addressing modes of 8085 microprocessor with examples.

5. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Interface 8085 microprocessor with 4KB RAM.

(b) Explain the hardware interrupts in 8085 and write instructions to enable all the interrupts.

(c) The following instructions have been executed by an 8085 microprocessor, what will be the next instruction to be fetched at the code last instruction (i.e. after PCHL) also show each instruction result given in the following code :

Address	Instruction
6010	LXI H, 8A79H
6013	MOV A, L
6014	ADD H
6015	DAA
6016	MOV H, A
6017	PCHL

TCS–404

B. TECH. (CSE/IT) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, 2018

COMPUTER ORGANIZATION

Time : 1 : 30 Hours

Maximum Marks : 50

Note :(i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False :   (1×5=5 Marks)

    (a) Which representation of signed numbers has a single representation for zero ?

    (b) State Amdahl's law.

    (c) How is exact +0 represented in IEEE 754 single precision representation.

    (d) In Reverse Polish notation, expression $A*B + C*D$ is written as ....

    (e) Which instruction format does a stack organized computer use ?

2. Attempt any *five* parts :   (3×15=15 Marks)

(a) Specify the sequence of operations involved in the complete execution of an instruction using a neat flowchart.

(b) Explain the format of IEEE 754 double precision floating point number representation with a neat diagram. Clearly indicate the size of the various sections.

(c) Give the Classical Performance Equation. On the basis of the equation, discuss in brief how the performance of a computer can be enhanced ?

(d) Represent the decimal value – 45 using :

(i) Sign Magnitude notation

(ii) 1's Complement notation

(iii) 2's Complement notation

(e) If a computer programmer is considering an enhancement that runs 10 times faster than the original algorithm but is usable only 40% of the time, what is the overall speedup gained by incorporating the enhancement ?

(f) Write a program that can evaluate the expression A*B + C*D in a single-

accumulator processor. Assume that the processor has Load, Store, Multiply and Add instructions and that all values fit in the accumulator.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Convert the following pairs of decimal numbers to 7-bit, signed, 2's complement binary numbers and add them. State whether or not overflow occurs in each case :

(i) + 25 and + 38

(ii) – 24 and + 63

(b) What is an addressing mode ? List the different types of addressing modes. Explain relative addressing modes with suitable examples.

(c) Explain single bus organization of the processor.

4. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) List and explain the developments made during different generations of a computer.

(b) Multiply the following pair of signed 2's-complement numbers using Booth

Algorithm. A is the multiplicand and B is the multiplier. Show the contents of registers in each step A 111000, B = 011111.

(c) Suppose a program (or a program task) takes 1 billion instructions to execute on a processor running at 2 GHz. Suppose also that 50% of the instructions execute in 3 clock cycles, 30% execute in 4 clock cycles and 20% execute in 5 clock cycles. What is the execution time for the program or task ?

5. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Represent the following decimal numbers using IEEE standard floating point notation :

(i) $+1.725$

(ii) -25.125

(b) What are the salient features of Von Neumann Architecture ? What is Von Neumann Bottleneck ?

(c) A computer has 32-bit instructions and 12-bit addresses. If there are 250 two-address instructions, how many one-address instructions can be formulated ?

Roll No. ....

TCS–408

B. TECH. (CSE) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, 2018

JAVA PROGRAMMING LANGUAGE

Time : 1 : 30 Hours

Maximum Marks : 50

Note :(i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False :   (1×5=5 Marks)

(a) We can declare interface as final but not a class.   (True/False)

(b) Constructors can be made static in Java.

(True/False)

(c) The Java compiler translates java source code to _____.

(d) _____ Operator is used to allocate memory to array variable in Java.

(e) _____ class is super class of String and StringBuffer class.

2. Attempt any *five* parts : (3×15=15 Marks)

(a) How is 'super' keyword used in Java ? Explain with proper example.

(b) Write a Java program to count and display total number of arguments as passed from command line.

(c) Discuss the concept of implicit and explicit type casting in java with typical examples.

(d) What is a constructor ? Write a Program in Java to demonstrate constructor overloading.

(e) What is the role of JVM in Java ?

(f) How can we restrict inheritance for a class so that no class can be inherited from it ?

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Differentiate between private, public and protected visibility modifiers. Explain 'final' keyword in java with the help of an example.

(b) Write Java programs to illustrate the following forms of inheritance :

(i) Multievel inheritance

(ii) Hierarchical inheritance

(c) What is the difference between interface and abstract class ?

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) What do you mean by a package ? List out the steps involved in creating and accessing your own package.

(b) Write a Java program to accept a word from the user and convert it into uppercase. Count number of vowels in even and odd positions :

Example : JavaProgram

Even Position : 3

Odd Position : 1

(c) Write a Java program to store 30 numbers in an array and find out the largest even number and smallest odd number.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Explain the various concepts of the Object Oriented paradigm.

(b) What is the difference between static method and instance method ? Explain with the help of a program.

(c) Explain the concept of overloading and overriding with suitable example.

TCS–471

B. TECH. (CSE) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, 2018

STATISTICAL DATA ANALYSIS WITH R

Time : 1 : 30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. State True-False : (1×5=5 Marks)

   (a) The sky is greyish-blue is a qualitative statement. (True/False)

   (b) Bivariate data deals with causes or relationship (True/False)

   (c) Correlation is negative when the values decreases together. (True/False)

   (d) Boxplot is the best option to represent "five number summary". (True/False)

   (e) Employee performance tracking data is quantitative data. (True/False)

2. Attempt any *five* parts :   (3×15=15 Marks)

(Define/Short Numerical/Short Programming/Draw)

(a) What is degree of freedom in correlation ?

(b) Explain the "Monty Hall" problem.

(c) Explain, why mean is sensitive towards outliers ?

(d) Explain the types of digital data.

(e) Write a short note on boxpiot.

(f) Explain the "five number summary".

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Differentiate between experimental probability and theoretical probability with some suitable example.

(b) Explain the four-step process : data production, exploratory data analysis, probability and inference.

(c) Calculate the mean, mode and median for the following series :

12, 15, 16, 35, 38, 45, 52

4. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Find the probability of rolling even numbers three times, using a six-sided die numbered from 1 to 6.

(b) Explain nominal, ordinal interval and ratio variable types with suitable example.

(c) Twenty-four people had a blood test and the results are shown below :

A, B, B, AB, AB, B, O, O, AB, O, B, A, AB, A, O, O, AB, B, O, A, AB, O, B, A

Construct a frequency distribution for the data and if a person is selected randomly from the group of twenty-four people, what is the probability that his/her blood type is not O ?

5. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Explain correlation, positive correlation and negative correlation with suitable examples.

(b) Write down the steps for getting data in "R", consider the format CSV file and text file.

(c) What is interquartile range (IQR) ? Explain and find the IQR for the given numbers : 2, 5, 7, 12, 14, 15, 17, 19, 22, 29, 40.

TCS–451

B. TECH. (CSE) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, 2018

VIRTUALIZATION AND CLOUD COMPUTING

Time : 1 : 30 Hours

Maximum Marks : 50

Note :(i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False :   (1×5=5 Marks)

   (a) Multiple instances of a variety of OS'es can .... a virtualized resource.

   (b) The .... hypervisor runs directly on server hardware to provide virtual machines with time sharing resources.

   (c) Access to a cloud environment always costs more money compared to a traditional desktop environment.

   (True/False)

(d) A Cloud environment can be accessed from anywhere in the world as long as the user has access to the Internet.

(True/False)

(e) AWS offers comprehensive Cloud IaaS services, ranging from virtual compute, storage and networking to complete computing stacks.   (True/False)

2. Attempt any *five* parts :   (3×15=15 Marks)

(Define/Short Numerical/Short Programming/ Draw)

(a) Define Cloud Computing as per NIST and explain its core features.

(b) Write a short note on Paravirtualization with suitable diagram.

(c) Explain TCO with suitable example.

(d) Differentiate between Traditional Computing environment and Cloud Computing environment for building applications.

(e) Briefly summarizes various challenges still open in Cloud Computing.

(f) What is the major revolution introduced by Web 2.0. ? Give examples of web 2.0 applications.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Discuss various perspectives of Cloud Computing. Briefly discuss the technologies that Cloud Computing relies on.

(b) Draw taxonomy of virtualization techniques. Explain system-level virtualization techniques in detail.

(c) Explain different stakeholders in Cloud Computing with suitable diagram.

4. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Describe Cloud Computing Reference Model with suitable diagram.

(b) Explain *five* essential characteristics of Cloud. List out any *five* cloud management software.

(c) What is virtualization ? Describe characteristics of virtualization along with pros and cons of virtualization.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) What is Xen ? Explain the Xen architecture with suitable diagram.

(b) What is hypervisor ? Explain *two* types of hypervisors with suitable diagram.

(c) Discuss briefly AWS. Mention the key components of AWS.

TIT–407

B. TECH. (IT) (FOURTH SEMESTER)
MID SEMESTER EXAMINATION, 2018
PYTHON PROGRAMMING
Time : 1 : 30 Hours
Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/ True-False : (1×5=5 Marks)

    (a) _____ is command checking version of Python in Ubuntu.

    (b) If word = "Python" is a string, then what does word[:–1] + word [–1:len(word)+1] will output ?

    (c) How to swap two variables a and b in python using a single statement ?

    (d) _____ statement can be used to input a string value from user.

    (e) _____ statement in Python prints all the numbers from 1 to 50 that are divisible by 7.

2. Attempt any *five* parts :   (3× 5=15 Marks)

(a) Write a program to print Fibonacci series up to N, where N is taken as input from user.

(b) What do you understand by the following Python statement ?
if _name_ = "_main_" :

(c) Write a Python program that prints all the even number from 1 to 100.

(d) "Lists and mutable while strings are immutable." What do you understand by this statement ? Explain using an example.

(e) Write a Python program that outputs all prime numbers between 1 to 100. This program should use for( ) loop, range( ) function and break statement.

(f) Write a Python program that calculates cube of all the numbers from 1 to 1000 (use range( ) function) and stores them in a list.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Explain the differences between List and Tuple using suitable examples. Use a list to implement stack (Last-In, First-Out)

and specify why is it more efficient to implement stack rather than implementing a queue ?

(b) Boolean operators and & or are called short-circuit operators. Why ? Write the functionality of the following methods of List very briefly and also provide an example with each of them :
append(x), index(x), remove(x), pop(), count(x), reverse()

(c) How can you use a list as queue (First-In, First-Out). Provide an example which uses a deque( ) function and list to insert and delete elements such that it behaves as a queue. Why is it so that lists are not considered efficient for inserting or popping elements from the beginning of a list, while appends and pops from the end of list are fast.

4. Attempt any *two* parts of choice from (a), (b) and (c).   (5×2=10 Marks)

(a) Dictionary in Python is called Hash or Associative array in some other languages. Create an empty Dictionary with name of your choice in Python. Can we have exactly two same keys within a dictionary ?

How can you delete a key : value pair from dictionary ? What does keys() method of dictionary do ? Provide suitable examples for all the functionalities that you want to illustrate.

(b) What is a Dictionary in Python ? Create a Dictionary that contains enrolment no and name of any *five* students you know in your college. Now add three more key-value pairs in the Dictionary and after that delete any 2 pairs of your choice.

Below is a sample Dictionary for 4 names and city pairs :

Name	City
1234	Deepak
1235	Ashish
1236	Manish
1237	Ankur

(c) Can you differentiate between a list, set and dictionary in Python ? Using suitable example show the following operations on above mentioned data structures :

add new elements, delete some existing element.

5. Attempt any *two* parts of choice from (a), (b) and (c).　　　　(5×2=10 Marks)

(a) What is a Module and Function in Python ? How do you save and import a Module in Python interpreter ? Create a Python module with name of your choice and show how can you call the functions that reside inside this Python Module.

(b) What is the difference between Class and Instance variables in Python ? Write a Python program which should include :

(i) A Python Class having name "MyClass."

(ii) A Constructor inside "MyClass" and it should be able to accept one argument.

(iii) A function inside MyClass with name "myFunction" and it should be able to print the value of Class variable and another variable that has been accepted by constructor.

(iv) Class should have a Class variable with any value but show it using a comment that it is a class variable.

(c) Why is Python called object oriented programming language ? Can you briefly explain object oriented features of Python ? Write a very short note on following python libraries-BeautifulSoup and NumPy.

Roll No. [ ][ ][ ][ ][ ][ ]   **Paper Code:** **TIT 402 / TCS 410**
                                                      TMC 401 / TMI 403

Mid Semester Examination 2018

B.Tech (IT/EC) / MCA / M.Sc. (IT) IV *Semester*

Data Structure using 'C' language.

Time: 1:30 Hours   **8**   MM: 50
Note:
(i) This question paper contains two sections.
(ii) Both sections are compulsory.

Section A

Attempt all questions. Each question carries one mark

Q1.   (1X5=5 Marks)

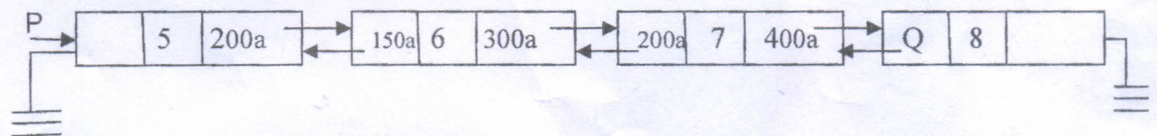**a)**   Write overflow conditions for circular queue(Array implementation)

b)   What will be output of following code?
        void main()
        {
         int a=3, *x, *y ,b=2, c;
         x=&b;
         y=&a
         *y=*y+*x;
         *x=*y+*x+b;
         c= *x+*y;

         printf("%d %d %d", a,b, c);
        }

c) Attempting to delete a node in empty link list results in ------------- (Fill in the blank)

d) What is the value of P and Q in following linked list

P
[5 | 200a] ⇄ [150a | 6 | 300a] ⇄ [200a | 7 | 400a] ⇄ [Q | 8 |]

e) In a singly linked list backtracking is not possible   (True /False)

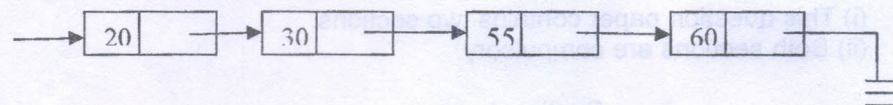**Attempt any Five parts.**   **(3X5=15 Marks)**

Q2.

a) Given the sequence of numbers: 13, 52, 95, 26, 38
   Write the sequence after the 3rd iteration of bubble sort.

b) Write code to search and update a node having info 55 from following linked list.
   First node of linked list is pointed by a pointer Q.

c) Write steps to find complexity of following code in terms of Big Oh notation.
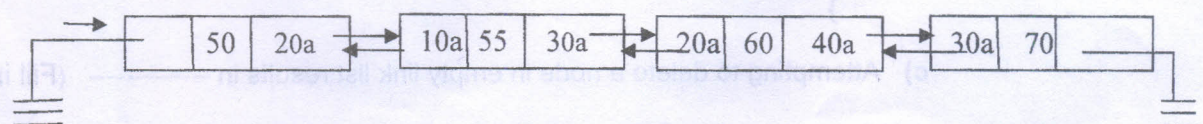
```
int n=10;
    for(i=1; i<=n; i++)
    {   x++;
    for(j=1; j<=n; j++)
        {
          Y++;
        }
    }
```

d) Differentiate between linked list and an array.

e) Write down algorithm for pop operation in stack (using linked list)

f) Write steps to insert a node between second and third node. First node is
   pointed by pointer P.

Section – B

Each question contains three parts a, b & c. Attempt any two parts of choice from each question.

Q3.   (5X 2 = 10 Marks)

    a. Write down an algorithm to serve operation in queue (Using linked list).

    b. Assume that we have two doubly linked lists having addresses D1 and D2. Write a C function to add first linked list after second linked list.

    c. Write C function to implement push operation using double pointer.

Q4.

$(5 \times 2 = 10 \text{ Marks})$

    a. Write a C function to create a dynamic array and store N elements in it. Then print 2nd repeating element from it.

    b. Write a C function to implement the selection sort. Illustrate the functionality of selection with the following input sequence: (2, 1, 36, 44, 10, 13, 19, 14, 29, 25).

    c. Create a singly linked list by inserting node in the left hand side. Input a key then count all those nodes having information greater than given key.

Q5.   (5X 2 = 10 Marks)

    a. Write a C function to create a queue and then print it from rear to front.

    b. Write C function to create a doubly linked list by inserting nodes such that linked list remains in ascending order.

    c. Consider following infix expression: z = (a - b) % d – (e * f) + (g ^h) then draw an expression tree for it and then find prefix expression.