

Name: Himanshu Kumar GautamReg. No. .... 2016CA75 .....

Department of Computer Science &amp; Engineering

Motilal Nehru National Institute of Technology, Allahabad

\*End Semester ( Theory ) Examination (ODD-Semester) 2016-17\*

Class: MCA First Semester 2016-17

Subject: Digital Computer Organization(Code:CA-3103)

M.M. : 60

Time: 3 Hrs

- Note:** 1. Attempt any FIVE(05) questions including Q.No.(1) which is COMPULSORY to ALL.  
 2. All parts of a question should be answered in one attempt SEQUENTIALLY.  
 3. Write to the point, exactly what is asked.  
 4. Make & State necessary Assumptions clearly.

**Q.No. 1** (A) Define the following terms in brief:

- (i) OS (ii) Cross Assembler (iii) Loader (iv) Linker (v) Macro processor (vi) Microprocessor
- (vii) Address (viii) ASCII Code (ix) I/O Controller (x) BIOS Program (xi) Mother Board
- (xii) Universal Gates (xiii) Lan Card (xiv) Power Card

(B) Write down the program for division of two 1-Byte numbers A &amp; B (A div B : A&gt;B) as discussed in the Class.

(C) What is Cache Memory? What do you mean by levels of cache? Is the cache memory also Expandable as RAM? Justify.

(D) A CPU needs 512 X 8 RAM &amp; 512X8 ROM with the help of available 128X8 RAM &amp; 512X8 ROM. Trace a neat diagram for the following:

- (i) Block diagram of the RAM chip (ii) Block diagram of the ROM chip
- (iii) Relevant Memory Address Map for the CPU (iv) Memory connection to the CPU

$$(07+03+02+(1+1+2+4)=20)$$

**Q.No. 2** (A) Simplify the function  $F(A,B,C,D)=\sum(0,1,2,5,8,9,10)$  using K-Map in SOP & POS forms.

(B) What is a Multiplexer? Trace Logic Diagram &amp; Function Table for 4-to-1-Line Multiplexer.

(C) Define a "BUS". Construct a BUS System using 4X1 MUX for 4 Registers, each with Size of 4 bits.

(D) Convert  $(9AF)_{16}$  to binary & find its  $2^5$  Complement.  $(03+03+03+01=10)$ **Q.No. 3** (A) Construct the following:

- (i) 4-bit Adder – Subtractor using Full Adder.
- (ii) 4-bit Binary Incrementer using Half Adder.

(B) A digital Computer has a Common BUS System for 16 Registers of 32 bits each. The BUS is constructed with Multiplexer. Answer the followings:

- (i) How many selection inputs are there in each Multiplexer?
- (ii) What size of Multiplexer are needed?
- (iii) How many multiplexers are there in the BUS.

(C) What is "Negative Logic"?  $((03+03)+03+1=10)$ 

(....Continued on Page No. 02)

**Q.No. 4** (A) Classify 8085 Instructions according to following (with one example in each):

- (i) Functions performed by the Instructions.
- (ii) Size of Instructions
- (B) Write down an Assembly Language program with proper comments for the followings:

(i) Sum of a Series of 8-Bit Numbers; SUM is also 8-Bit.

(ii) Product of two 8-Bit Numbers; Product is 8-Bit.

(04+(03+03)=10)

**Q.No. 5(A)** What do you understand by “Addressing Modes”? Discuss various Addressing Modes of INTEL 8085 Microprocessor with Example.

(B) Trace a Logic for setting the bits of Status Register of a CPU.

(C) What is an Instruction Cycle? Explain properly.

(D) What is Interrupt & PSW? Explain.

(03 + 02 +03 +02=10)

**Q.No. 6(A)** Define the Followings in reference to Control Memory:

(i) Control Word (ii) Microinstruction (iii) microprogram (iv) Control Memory (v) Control Address Register (vi) Sequencer (vii) Pipe line Register (viii) Hard wired Control

(B) Explain properly the Selection of Addresses for Control Memory.

(C) Is it possible to design a Microprocessor without a microprogram? Are all microprogrammed Computers also Microprocessors.

(04+04+02 = 10 )

**Q.No. 7(A)** What is Associative Memory? Explain its organization using Block diagram. What is role of Argument, Key & Match Registers? Explain with a simple example.

(B) Explain in brief Match Logic for one word of Associative Memory with relevant associated derivations.

(C) How write operation is performed in Associative Memory?

(04+04+02=10)

**Q.No. 8(A)** Explain the followings in brief:

(i) Set Associative Mapping (ii) Writing into Cache

(B) What is Virtual Memory, Address & Memory Space?

(C) Explain in brief Address Mapping using Pages.

(04+03+03=10)

**Q.No.9** Write Short Notes on any FIVE of the followings:

(A) Computer Generations (B) Flip-Flops (C) Stack Organized CPU

(D) Decoders (E) Counters (F) Booting steps of an IBM PC

(G) Hard Disk (H) Optical Disks

(2 X 5 =10 )

\* END \*

Name: Shreyansh Agarwal

Reg. No....20.16.CA.8

**Department of Computer Science & Engineering  
Motilal Nehru National Institute of Technology, Allahabad**  
**\*Mid Sem. Examination (ODD-Semester) 2016-17\***

M.M. : 20 Class: MCA First Semester 2016-17  
Subject: Digital Computer Organization(Code:CA3103) M. Hrs: One & Half

**Note:** 1. ALL Questions are compulsory.  
2. Attempt ALL questions serially starting from Question No.1.  
3. Write ALL parts of a question together in one attempt NOT here & there.  
4. Write to the point. Make & State necessary assumptions.

**Q.No.1 (a)** Simplify the following Boolean function using 4-variable maps :

$$F(A,B,C,D) = \sum (0,2,4,5,6,7,8,10,13,15) \quad (02)$$

(b) What is "Full Adder" Circuit ? Trace the following for Full Adder Circuit :

(c) Why there is NO need of Read or Write pins in ROM? (01)

**Q.No.2** (a) Trace Block diagram of 8085 Microprocessor. (02)  
(b) How Status Flags in 8085 Microprocessor are set? Explain. (01)  
(c) Write purpose of any 20 Pins of 8085 Microprocessor. (01)

**Q.No.3** Explain the following :

(a) Register  
 (b) Registers with parallel load  
 (c) Shift Register  
 (d) Binary counter  
 (e) Binary Counter with parallel load  
 (f) Multiplexer

**Q.No.4** A digital Computer has a Common Bus System for 16 Registers of 32 bits each. The BUS is constructed with Multiplexers. Answer the following with JUSTIFICATION: (02) +

(a) How many selection inputs are there in each Multiplexer ?

(b) What size of Multiplexers are needed ?

(c) How many Multiplexers are there in the BUS?

Q.No.5(a) Explain in brief Construction & Working of Hard disk Drive OR Pen Drive. (02)  
(b) Write Truth Tables and Excitation Tables for RS, JK, D and T Flip-Flops. (02)  
(c) Convert  $(9AFC)_{16}$  to binary and find it's 2<sup>s</sup> Complement. (01)

\* END \*

**Department of Computer Science & Engineering  
Motilal Nehru National Institute of Technology, Allahabad.  
\*\*End Sem. Examination (ODD-Semester) 2016-17\*\*  
Class: MCA Ist Semester 2016-2017  
Subject: Foundation of Logic Code: (CA3104)**

**M.M.:60 Marks****M.Hrs: 3 Hrs.**

Instructions: 1) Write (precise /to the point) answers.

2) All questions are compulsory.

3) Assume and state suitable assumptions wherever necessary.

**Q1.**

- a. Consider the statement which have premises and the conclusion. Find out whether the premises are able to prove the conclusion by using truth table. [4]  
 "If horses fly or cows eat grass then the mosquito is the national bird. If the mosquito is the national bird then peanut butter tastes good on hot dogs. But peanut tastes terrible on hot dogs. Therefore cows don't eat grass"
- b. Use quantifier and predicate with more than one variable to express these statement. [3]
- Every computer science students need a course in discrete mathematics.
  - There is a student in this class who owns a personal computer.
- c. Find the truth value of  $[p \rightarrow (q \wedge \neg r) \vee s] \wedge [(\neg t) \leftrightarrow (s \wedge r)]$  where t is false and p, q, r and s are true [3]

**Q2.**

- a. Let  $f : X \rightarrow Y$  be an everywhere define invertible function and A and B be arbitrary non empty subsets for Y such that : [4]
- $f^{-1}(A \cup B) = f^{-1}(A) \cup f^{-1}(B)$
  - $f^{-1}(A \cap B) = f^{-1}(A) \cap f^{-1}(B)$
- b. Consider the following relation on set  $A = \{1, 2, 3, 4, 5, 6\}$   $R = \{(i, j) : |i-j|=2\}$ . Is R is reflexive, symmetric or transitive? [3]
- c. if R be the relation in the set of integer Z defined by  $R = \{(x, y) : x \in Z, y \in Z, x-y \text{ is divisible by } 3\}$  Derive the distinct equivalence classes of R. [3]

**Q3.**

- a. Find the group of symmetries of equilateral triangle. [4]
- b. State and Prove the Lagrange's theorem. [3]
- c. If in a group G, the elements a and b commute, then prove that [3]
- $a^{-1} * b^{-1} = b^{-1} * a^{-1}$
  - $a^{-1} * b = b * a^{-1}$

**Q4.**

- a. Answer these question for the poset  $(\{\{1\}, \{2\}, \{4\}, \{1,2\}, \{1,4\}, \{2,4\}, \{3,4\}, \{1,3,4\}, \{2,3,4\}\}, \subseteq)$ . [4]
- Find all upper bound of  $\{\{2\}, \{4\}\}$ .
  - Find the greatest lower bound of  $\{\{1,3,4\}, \{2,3,4\}\}$  if it exists.  $\{\{1,2\}\}$
  - Find the maximal element.  $\{\{1,3,4\}\}$   $\{\{2,3,4\}\}$
  - Find the minimal element.  $\{\{1\}\}$

b. Scheduled the tasks needed to build a house, by specifying their order, if the hasse diagram representing these tasks is as shown in the figure1. [3]

c. Determine whether the poset with these Hasse diagram are lattice from the figure2. [3]

**Q5.**

- a. Solve the recurrence relation by the method of generating function.  
 $a_r - 7a_{r-1} + 10a_{r-2} = 3^r$   $r \geq 2$   
 with the boundary condition  $a_0 = 0$  and  $a_1 = 1$ . [4]
- b. It is given that white tiger population of Orissa is 30 at time  $n=0$  and 32 at time  $n=1$ . Also the increase from  $n-1$  to time  $n$  is twice the increase from time  $n-2$  to  $n-1$ . Write recurrence relation for growth rate of tiger and solve it. [3]
- c. Solve the recurrence relation by the method of characteristic root  
 $Y_{n+2} - Y_{n+1} - 2Y_n = n^2$  [3]

**Q6.** Write short notes on the following.

- a) Monoid with example.  
 c) Topological sorting with example.

- b) Integral domain with example.  
 d) Contradiction with example.

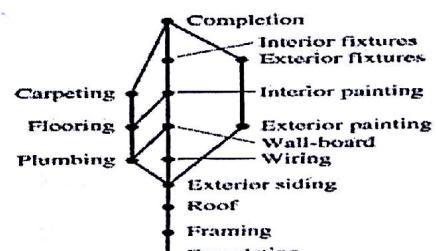
**[10]**

Figure 1

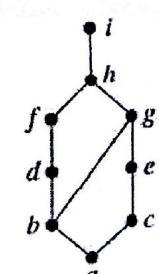
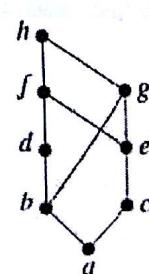


Figure 2

# Motilal Nehru National Institute of Technology Allahabad

## Department of Computer Science & Engineering

MCA First Semester

Mid Semester Examination 2016-17

Subject Code/Name: CA3104/Foundation of Logic

Duration: 90 Minutes

Max. Marks: 20

### NOTE:

- All questions are compulsory.
- Attempt the questions in sequential order.
- Answers should be justified & to the point.

1. Let the Set  $A = \{0, 1, 2, 3, \dots\}$  and  $R = \{(a, b) : a - b = 4m, m \text{ is any integer}\}$  is an equivalence relation defined on set A. Find out equivalence classes and rank of set A. (3)
2. Determine whether each of these compound propositions is satisfiable using Truth Table.
  - a.  $(p \vee \neg q) \wedge (\neg p \vee q) \wedge (\neg p \vee \neg q)$
  - b.  $(p \rightarrow q) \wedge (p \rightarrow \neg q) \wedge (\neg p \rightarrow q) \wedge (\neg p \rightarrow \neg q)$  (3)
3. Determine whether each of these functions from set  $A = \{a, b, c, d\}$  to itself is one-to-one, onto or both.
  - a.  $f(a) = b, f(b) = a, f(c) = c, f(d) = d$
  - b.  $f(a) = b, f(b) = b, f(c) = d, f(d) = c$  (2)
4. Let  $S(x)$  be the predicate of "x is a student"  $F(x)$  be the predicate of "x is a faculty member" and  $A(x, y)$  of the predicate "x has asked y a question" where the domain consist of all people associated with your school. Use Quantifier to express each of the statements
  - a. Every faculty member has either asked Professor Arun a question or been asked a question by Professor Arun.
  - b. Some student has not asked any faculty member a question.  $\exists x(S(x) \rightarrow F(x) \wedge \neg A(x))$  (2+2)
5. Translate the given nested quantification into an English statement that express a Mathematical fact, The domain of x, y and z are considered as positive integer.  
 $P(x) = \neg(x=1) \wedge \forall y(\exists z(x=y*z) \rightarrow (y=x) \vee (y=1))$  (2)
6. Write a short note on of the followings :
  - a. Contrapositive with example.
  - b. Poset with example. (1.5+1.5)
7. Let S be the set of all strings of English Letter, Determine whether these relation are reflexive, irreflexive, symmetric or antisymmetric.
  - a.  $R_1 = \{(a, b) : a \text{ and } b \text{ have no letters in common}\}$
  - b.  $R_2 = \{(a, b) : a \text{ and } b \text{ are not the same length}\}$
  - c.  $R_3 = \{(a, b) : a \text{ is longer than } b\}$  (3)

**MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY ALLAHABAD**

**MCA I Semester: End Semester Examination (Odd Semester, 2016-17)**

**(CA 3102) Principles of IT Industries Management**

**Max. Marks: 60**

**Time: 3:00 Hr.**

**Section A: Attempt all questions in this section. All questions carry equal marks. (3X4 = 12)**  
Write short notes on the following:

- (a) Fish-bone diagram
- (b) Responsibility Assignment Matrix (RAM)
- (c) Benchmarking
- (d) Acceptance sampling

**Section B: Attempt any four questions. Each question carries equal marks. (5X4 = 20)**

- B: 1 Discuss the objectives of quality control. Also explain the steps involved in the process of quality control.
- B: 2 Explain the concept of re-order point, re-order quantity and lead time. Discuss the impact of buffer stock on inventory management.
- B: 3 Briefly discuss the various elements of inventory cost.
- B: 4 Differentiate between black-box testing and white-box testing.
- B: 5 Discuss in brief the principles of scientific management.

**Section C: Attempt any three questions. (6X3 = 18)**

- C: 1 "Supply chain encompasses all activities involved in the transformation of goods from the raw material stage to the final stage". Comment on the statement highlighting the importance of supply chain management. Also discuss various types of supply chain.
- C: 2 Discuss in brief the bullwhip effect in supply chain management.
- C: 3 Explain in brief any three techniques for quality control.
- C: 4 What roles Green IT plays in tackling the issue of environmental pollution?

**Section D: Attempt any one: (10X1 = 10)**

- D: 1 Briefly explain the concepts of ABC analysis, Just in Time inventory, and economic order quantity in inventory management.

**D: 2 Case Study**

Tom (Bloks Ltd.), and Deirdre, (Fones Ltd.), are employed as production managers. Last night, both of them attended a staff development meeting organized by a Production Management Institute (a professional body), of which they are members. During the tea-break, Tom and Deirdre discussed the various leadership styles that they were following in their respective organisations.

Tom told Deirdre that he had a friendly personality and was optimistic that he will get well with the workers in the factory. He went on to say that a total of fifty workers are employed, with 40 of them having been employed with the business for over 20 years. The others, mostly unskilled, tend to be younger workers who stay for a year or so and then move on, since Tom thinks they are harder to motivate. Tom is aware that new Health & Safety regulations are due to be implemented and this will require discipline in the workers. He is thinking of adopting a more autocratic leadership style.

Deirdre told Tom that she was newly appointed to the role, and was relatively inexperienced. She pointed out that she manages a team of forty workers, grouped into project teams with highly skilled and experienced staff in each team. Deirdre mentioned that her predecessor was unpopular with the work force since he adopted an autocratic style of leadership at one stage, the Labour Relations Agency were asked to mediate in the dispute regarding management/employee relations. In view of this, she had been thinking of adopting a democratic leadership style.

- 1. Discuss whether or not Tom and Deirdre should adopt their proposed new leadership styles within their respective organisations.
- 2. With reference to each organisation, discuss the role of management in motivation.

**MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY ALLAHABAD**  
**MCA I Semester: Mid Semester Examination (Odd Semester, 2016-17)**  
**(CA 3102) Principles of IT Industries Management**

**Max. Marks: 20**

**Time: 1:30 Hr.**

**Section A: Attempt all questions in this section. All questions carry equal marks. (5 X 1 = 5)**

A 1: Write short notes on the following:

- (a) Scalar chain principle
- (b) Motion study
- (c) Illumination study
- (d) Conceptual skills
- (e) Job specification

Informational role  
Decision-making role

**Section B: Attempt any three questions. Each question carries equal marks. (3 X 3 = 9)**

B 1: "Behavioral approach to management is all about acknowledging the importance of human behavior in shaping management style". Comment on the statement and describe in brief the Hawthorne study.

B 2: Explain the skills required to perform various managerial roles in an organization?

B 3: What are the different roles performed by a manager in an organization?

B 4: "Leadership is a vital element in the management process". Considering the statement briefly explain the various leadership styles followed by a manager.

**Section C: Attempt any one questions. Each question carries equal marks. (1 X 6 = 6)**

C 1: "Management of human resources is very essential for any organisation and without this no organisation can think of achieving its desired objectives". Comment on the statement and discuss the importance of human resource management. Also discuss the process of human resource planning.

C 2: Discuss in detail any three motivational theories. Also state the relationship between Maslow's Need Hierarchy Theory and Herzberg's Two-Factor Theory.

**Motilal Nehru National Institute of Technology Allahabad**  
**Department of Computer Science & Engineering**  
MCA I Semester (End Semester Exam)  
November 2016

**Programming and Problem Solving: (CA3101)**

**M.Marks: 60**

**Time : 180 Minutes**

**NOTE:**

- All sections are compulsory
- Attempt the questions **strictly** in sequential order.
- Answers should be justified & to the point

**SECTION A [4\*8=32 Marks]**

**1. Using short code snippets illustrate the following**

- a) Pass a 1 d array to a function.
- b) Pass a 2 d array to a function.
- c) Return pointer to 2 d array through function
- d) Pass and return structure to a function using call by value and call by reference.

**2. Answers the following questions**

- a) Is it really true that there is no limit on the length of identifier? Explain.
  - b) What does scanf do if it is asked to read a number but the user enters nonnumeric character?
  - c) Why are the rules for using the / and % operators with negative operands so complicated?
  - d) There is no logical exclusive OR operator in C; Can it be simulated anyway?
- 3. Differentiate between structure & array. Define a structure named Player that contains following fields: Player name, Team name and Runs. Declare an array of structure variables with 10 elements of type Player and write a program in C to read the information about all 10 players and print a team-wise list containing names of players with their runs.**
- 4. Write a program in C that would sort a list of names in alphabetical order.**

## SECTION B: [10+8+10 Marks]

### 1. Answers the following questions.

- a. What is the purpose of function prototype?
  - b. Differentiate between break and continue.
  - c. How can we return multiple values from a function? Explain with an example.
  - d. Write the function definition of strlen() that should return length of a string.
2. Given an array of integers, find the first repeating element in it. Write a program in C to find the element that occurs more than once and whose index of first occurrence is smallest.
3. Given an array containing positive and negative numbers. The array represents checkpoints from one end to other end of street. Positive and negative values represent amount of energy at that checkpoint. Positive numbers increase the energy and negative numbers decrease. Write a program in C to find the minimum initial energy required to cross the street such that Energy level never becomes 0 or less than 0.

**Note:** The value of minimum initial energy required will be 1 even if we cross street successfully without loosing energy to less than and equal to 0 at any checkpoint. The 1 is required for initial check point.

```
Input : arr[] = {4, -10, 4, 4, 4}
Output: 7
Suppose initially we have energy = 0, now at 1st
checkpoint, we get 4. At 2nd checkpoint, energy gets
reduced by -10 so we have  $4 + (-10) = -6$  but at any
checkpoint value of energy can not less than equals
to 0. So initial energy must be at least 7 because
having 7 as initial energy value at 1st checkpoint
our energy will be  $= 7+4 = 11$  and then we can cross
2nd checkpoint successfully. Now after 2nd checkpoint,
all checkpoint have positive value so we can cross
street successfully with 7 initial energy.
```

```
Input : arr[] = {3, 5, 2, 6, 1}
Output: 1
We need at least 1 initial energy to reach first
checkpoint
```

```
Input : arr[] = {-1, -5, -9}           -1 - 5
Output: 16                            - 6 + 7
```

**NOTE:**

- All sections are compulsory
- Attempt the questions **strictly** in sequential order.
- Answers should be justified & to the point

**SECTION A [4\*1.5=6 Marks]**

Assume library (#include<stdio.h>, #include<string.h>, #include<math.h>), and return 0 and main function if missing. Give the outputs of the following program segments assuming 32 bit compiler. Justify your output through explanation.

1. What is the output printed by the following C code? Justify your answer.

```
#include<stdio.h>
int main () {
    int theNum, total;
    total = 1;
    theNum = 5;
    while (theNum > 1) {
        total *= --theNum;
    }
    printf ("%d", total);
    return 0;
}
```

2. Predict the output of the following program.

```
#include<stdio.h>
int main () {
    char c;
    for (c='a'; c<'g'; ++c) {
        switch (c) {
            case 'a': c += 2;
            case 'c': c += 1;
            case 'g': ++c;
            default:   ++c;
        }
        printf ("%c\n", c-- );
    }
}
```

```
    }
    printf ("*** %c\n", c);
}
return 0;
}
```

3. Predict the output of the following program.

```
#include<stdio.h>
int main(){
    int a=5,b=10,x;
    if((a<++a||b<++b&&b<a++)?x=a|b:b)
        printf("%d%d%d",a,b,x);
    else
        printf("John Terry");
}
```

4. Predict the output of the following program.

```
#include<stdio.h>
int main()
{
    int i,a,b,sum;
    for(i=10;i<100;i++)
    {
        a=i/10; b=i%10; sum=a+b;
        if(b==(a-4) && (i/sum)==7)
            printf("%d\n",i);
    }
    return 0;
}
```

## SECTION B: (Attempt any two questions) Marks (2\*3=6)

1. Write a program in C for power set. Power set  $P(S)$  of a set  $S$  is the set of all subsets of  $S$ . For example  $S = \{1, 2, 3\}$  then  $P(s) = \{\{\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$ . If  $S$  has  $n$  elements in it then  $P(s)$  will have  $2^n$  elements.
2. Given a binary array and an integer  $m$ , find the position of zeroes flipping which creates maximum number of consecutive 1s in an array. Write a program in C for finding zeroes to be flipped so that number of consecutive 1's is maximized.

For examples:

### Example1:

**Input:** arr[] = {1, 0, 0, 1, 1, 0, 1, 0, 1, 1, 1}  
m = 2

**Output:** 5 7

We are allowed to flip maximum 2 zeroes. If we flip arr[5] and arr[7], we get 8 consecutive 1's which is maximum possible under given constraints

### Example2:

**Input:** arr[] = {1, 0, 0, 1, 1, 0, 1, 0, 1, 1, 1}  
m = 1

**Output:** 7

We are allowed to flip maximum 1 zero. If we flip arr[7], we get 5 consecutive 1's which is maximum possible under given constraints.

### Example3:

**Input:** arr[] = {0, 0, 0, 1}  
m = 4

**Output:** 0 1 2

Since m is more than number of zeroes, we can flip all zeroes.

3. An array of size  $N$  is given,  $N$  is even. In this array one entry is repeated  $n/2$  times and the remaining  $n/2$  entries are unique. Write a program in C to find the repeated value.

## SECTION C: Marks (4+2+2=8 Marks)

1. Write short notes with example.
  - a) continue and break
  - b) Type conversion and Type casting
2. How to access 2 dimensional array's elements using pointer? Explain.
3. When a switch statement is better than multiple if statements? Show with an example.